

The Phonology and Morphology of Arabic

Janet C. E. Watson

THE PHONOLOGY OF THE WORLD'S LANGUAGES

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OXFORD
UNIVERSITY PRESS

Great Clarendon Street, Oxford OX2 6DP

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide in

Oxford New York

Athens Auckland Bangkok Bogotá Buenos Aires Cape Town
Chennai Dar es Salaam Delhi Florence Hong Kong Istanbul Karachi
Kolkata Kuala Lumpur Madrid Melbourne Mexico City Mumbai Nairobi
Paris São Paulo Shanghai Singapore Taipei Tokyo Toronto Warsaw

with associated companies in Berlin Ibadan

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in the UK and in certain other countries

Published in the United States
by Oxford University Press Inc., New York

First published 2002
First published in paperback 2007

British Library Cataloguing in Publication Data
Data available

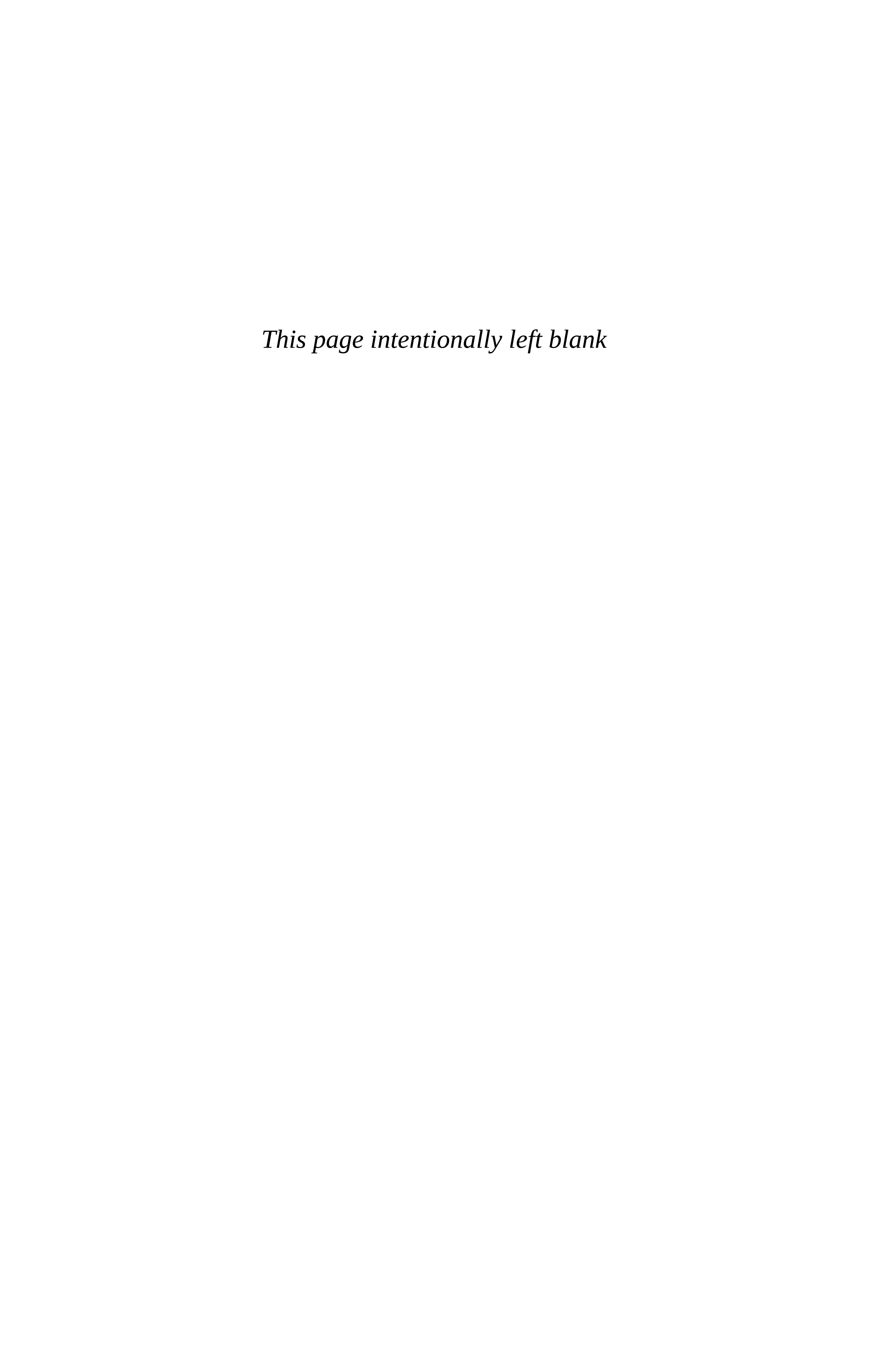
Library of Congress Cataloging in Publication Data
Data applied for

ISBN 978-0-19-925759-1 (Hbk.) 978-0-19-922669-6 (Pbk.)

1 3 5 7 9 10 8 6 4 2

Typeset in Times
by SPI Publisher Services, Pondicherry, India
Printed in Great Britain
on acid-free paper by
Biddles Ltd., Guildford & King's Lynn

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PREFACE

The Orient has, for centuries, had its own magnetism for the orientalist. The names of Freya Stark, Lawrence of Arabia, Wilfred Thesiger, and Richard Burton conjure up images of sweeping deserts, ancient skyscrapers, pharaonic treasure, and the maze of bustling souks. Theirs was travel in its essence, travail in its true, original sense, and the images they record are every bit as colourful as the images they saw. But there is a different type of travel in these lands. Travel through the words and sounds of the people of the Orient. A journey which takes the traveller into the upper rooms of ancient houses and into the deep, dusty backstreets of ageless markets. A journey of listening, and recording, sounds and words and utterances, secrets and memories and hopes. A journey which conjures up, far more brilliantly than a swift race through the pyramids and past the ancient Marib dam, the real living jewels of the Orient. A journey which reminds the traveller that the Orient is its people and their story; and a journey which reminds the Arabist that beside the written language and the learned works of those who went before us there is another Arabic. A living language with traces of the past and hints of the future; and a language which humbles and shows us that things may not be as we thought they were.

This book has emerged from such journeys, from several trips to Egypt during the 1980s, and from many more to Yemen over the past sixteen years. This is a record of the sound and word structure of Cairene and San'ani Arabic at the advent of the twenty-first century. Both dialects are changing all the time, and San'ani, now bravely fortified behind restored ramparts of clay and time-honoured traditions, may yet succumb to the forces of change, and may eventually die. It is to the speakers of these dialects, and particularly to the women of the old city of San'a, that I dedicate this book.

J.W.

2001

ACKNOWLEDGEMENTS

I wish to thank the Leverhulme Trust for a two-year research grant (1997–1999), during which period most of the work for this book was completed, the University of Durham Staff Travel Fund for funding to travel to Yemen in 1997, 1998, and 2000, the British Academy for a grant which enabled me to spend a year in San'a (2000–2001) and fill the remaining gaps, the Yemen Language Center for facilitating my year in Yemen, the Society for Arabian Studies for funding production of the index, and CMEIS for granting me the year's leave of absence. Many thanks to Lisa Selkirk and Manfred Woidich for giving me permission to refer to their unpublished work. My thanks to Hamish Erskine for solving my computer problems and rescuing the manuscript are almost inexpressible. I also wish to thank the following people for their assistence and encouragement at various stages during the writing of this book: Dick Hayward, Manfred Woidich, S. J. Hannahs, Judith Broadbent, John Davey, Sarah Dobson, Chris Knight, Jacques Durand, Mohamed Elmedlaoui, Nicola Erskine, Andrzej Zaborski, Tim Niblock, Andrew Freeman, Tim Mackintosh-Smith, James Dickins, Bruce Ingham, Clive Holes, Otto Jastrow, Ellen Broselow, Sabri Salim, Muhammad al-Haddad, Markus Wachowski, Werner Arnold, Peter Kahrel; my Cairene informants Mohamed Abol-Kheir, Ahmad Lutfi and Maggie Kamel; and my San'ani informants Abd al-Salam al-Amri, Abd al-Karim al-Amri, Abd al-Wahhab al-Sayrafi, Ibrahim al-Haddad, Abd al-Ilah al-Haymi, Abd al-Karim al-Akwa', Hasan al-Shamahi, Muhammad Naji, Muhammad al-Kibsi, Abd al-Rahman al-Kibsi, 'Baba' Abd al-Rahman Mutahhar, Husayn Zabara, and the women and children of Bayt Banga, Bayt Shamiya, Bayt al-Sayrafi, Bayt al-Gini, Bayt al-Haddad, and Bayt al-Duhaydah. Finally, a big thank you to my husband, James Dickins, for reading the manuscript, and to my children, Alistair and Sarah, for coming half-way across the world with me so that I could finish a book.

ABBREVIATIONS

Abbreviation	Meaning
adj.	adjective
C	consonant
C′	unsyllabified consonant
[C]	[coronal]
CA	Cairene Arabic
coll.	collective
CSS	Closed Syllable Shortening
[D]	[dorsal]
ERR	End Rule Right
F	foot
[F]	[feature]
f.	feminine
Fr	fricative
G, GG	geminate consonant
[G]	[guttural]
Gl	glide
imperf.	imperfective
indef.	indefinite
intr.	intransitive
L	liquid
[L]	[labial]
m., masc.	masculine
N	nucleus; nasal
n.	noun
neg.	negative
nom.	nominalizer
O	onset; occlusive
obs.	obsolete
OCP	Obligatory Contour Principle
P	sonority plateau
perf.	perfective
PINP	Phonetic Interpretation of Non-Primary Place
PIPP	Phonetic Interpretation of Primary Place
pl.	plural
R	rhyme; sonority reversal
RSC	Rank–Stricture Correspondence
s., sg.	singular
S	sibilant
SA	San’ani Arabic
So	obeys sonority hierarchy
SSP	Sonority Sequencing Principle
TC	Tier Conflation
UAC	Universal Association Convention
V	vowel
v.	verb
VL	vowel lengthening
VS	vowel shortening
ω	prosodic/phonological word
WP	Weight-by-Position
μ	mora; morpheme node
σ	syllable node
(σ)	incomplete syllable
⟨a⟩	extraprosodic element (extrasyllabic, extrametrical)
+	morpheme boundary
→ / >	‘becomes’ in synchronic or diachronic rule
X	skeletal slot
.	syllable boundary
ā, a:, aa	long vowel
*	ungrammatical form; reconstructed form
ˈ	preceding a stressed syllable
a ~ b	*a* alternates with *b*
/abc/	underlying representation
[abc]	phonetic representation
(,)	metrical bracket
//	mirror-image rule

To James, for everything.

And to the wife and daughters of the late Muhammad Ali Ali al-Sayrafi, for letting me share their daily lives.

1

INTRODUCTION

In this chapter I sketch the development of Arabic from its Proto-Semitic ancestor to the present-day dialects. I begin by looking at common features of Semitic phonology, morphology, and syntax. I then consider the position of Arabic within the Semitic phylum as a Central Semitic language which also exhibits several shared traits with South Semitic. In Sections 1.2.1–3, I consider the spread of Arabic from the Arabian Peninsula, the development of the standard language and the phenomenon of diglossia. In Section 1.3 I introduce the main focus of this work, the modern dialects of Cairene and San'ani Arabic.

1.1 THE SEMITIC LANGUAGE FAMILY

Arabic is a member of the Semitic language family, which itself is part of the wider Afroasiatic phylum including Ancient Egyptian, Coptic, Cushitic,[1] Berber, and Chadic. Other principal members of the Semitic family are the East Semitic languages of Akkadian and Eblaite (both now long dead), and the West Semitic languages Aramaic, Ugaritic, the Canaanite languages (including Hebrew), ancient and modern South Arabian, and the Semitic languages of Ethiopia (for example, Ge'ez, Tigre, Tigrinya, and Amharic) (Hetzron 1992: 412–13;[2] Faber 1997: 6; cf. Beeston 1970: 11). Common features of Semitic in terms of the phonology, morphology, and syntax are set out in the following sections.

1.1.1 *Phonology*

Semitic languages are marked by a limited vocalic system and a rich consonantal system. There are typically three basic vowels *a*, *i*, *u*, which are attested in both their short and long forms. Semitic languages are also marked by a rich inventory of guttural consonants, which includes both the laryngeals *ʔ*, *h*, the pharyngeals *ᶜ*, *ḥ* and the uvular fricatives *χ* and *ʁ*. The consonantal phonemes of Semitic languages usually constitute triads of voiceless, voiced and 'emphatic' in certain

[1] Hetzron (1992: 413) includes Omotic and Beja ('if the latter two are separate branches'). According to Zaborski (p.c.), Beja is a Cushitic language and not an independent branch of Afroasiatic.

[2] Hetzron divides Arabic into the following fourteen dialect groups: Balkh, Classical, Cypriot, Eastern Colloquial, Egyptian, Hassaniya, Judeo-Moroccan, Judeo-Tunisian, Modern Standard, Moroccan, Northeastern Colloquial, Shua, Sudanese and Western Colloquial (Hetzron 1992: 416).

sub-sets of the coronal set, and in a few languages, including dialects of Arabic spoken in parts of south-west Yemen, in the dorsal set. ‘Emphatic’ sounds today are pharyngealized in the Central Semitic languages of Arabic and Neo-Aramaic, and glottalized in the South Semitic languages of Modern South Arabian and Ethiopian Semitic (Faber 1997: 8). Descriptions of eighth-century CE Classical Arabic suggest a velarized articulation for the emphatics in this dialect. A glottalized articulation of the emphatics is generally reconstructed for Proto-Semitic (Martinet 1959: 93; Dolgopolsky 1977; Hetzron 1992: 413; Faber 1997: 8). Common or Proto-Semitic appears to have had voiceless, voiced, and emphatic triads in four sub-sets of the coronal set (including a lateral sub-set) and in the dorsal set (Lipinski 1997: 107). The Proto-Semitic voiceless, voiced and emphatic triads are represented in Figure 1.1.

Within the lateral set, the voiceless lateral, *ɬ, and the emphatic lateral, *ɬ̣, were both realized as lateral fricatives, while the voiced lateral appears to have had a similar articulation to the plain lateral *l* attested in Semitic languages today. The Proto-Semitic emphatic lateral fricative, *ɬ̣, is the ancestor of the Classical Arabic phoneme known as *ḍād* (Rabin 1951; Moscati *et al.* 1964; Fischer 1997: 189). Descriptions by the Arab grammarians show unambiguously that *ḍād* continued to be articulated as an emphatic lateral fricative well into the eighth century CE (Rabin 1951: 33; Steiner 1977: 57 ff.). Rabin also claims that *ḍād* was articulated laterally by some twentieth-century Qur’anic readers (Rabin 1951: 33). *ḍād* continues to be articulated laterally in dialects of Arabic spoken in parts of the Hadramawt of southern Yemen (Landberg 1901; Habtoor 1989) and some dialects in Asir (M.A. Al-Azragi p.c.).

The voiceless lateral, *ɬ, is classified as one of the three sibilants of Proto-Semitic. It is referred to as $*s^2$ in descriptions of ancient South Arabian languages (Moscati *et al.* 1964: 33) and there is considerable morphological evidence to show that it is the ancestor of Classical Arabic *šīn* (Moscati *et al.* 1964: 34; Lipinski 1997: 124, 131; Rabin 1951: 209, note 7; cf. Fischer 1997: 189), with the original palatoalveolar sibilant of Proto-Semitic (*š or $*s^1$) apparently having coalesced historically with $*s^3$ to become, over the course of time, the dental sibilant, *s* (Lipinski 1997: 124). The reflex of $*s^2$ in modern South Arabian languages is a lateral fricative (Kogan and Korotayev 1997: 222; Simeone-Senelle 1997: 381–2). By the eighth century CE, the phoneme known as *šīn* had lost its laterality in Arabic,

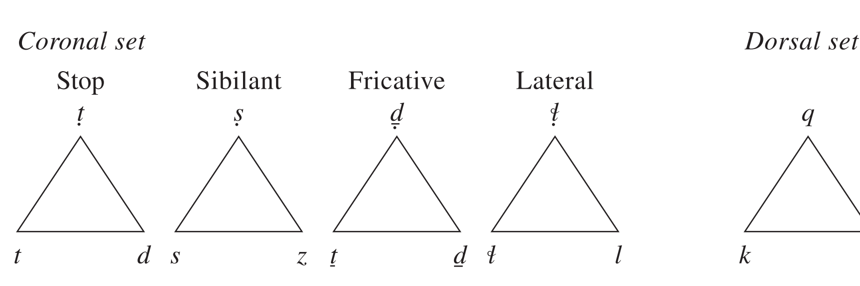


FIGURE 1.1. Proto-Semitic triads

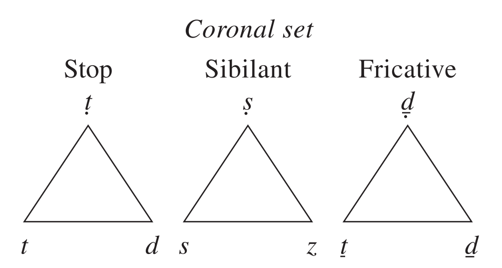


FIGURE 1.2. Eighth-century CE Classical Arabic triads

or at least in Classical Arabic[3] and, from what we can infer from the writings of the eighth-century CE Arab grammarian, Sibawayh, was articulated as a voiceless palatal fricative, with an articulation similar to German /ç/ (Watson 1992: 74; Lipinski 1997: 124, 130). The phoneme *jīm*, which probably had an original velar articulation in Proto-Semitic, moved forward and, according to Sibawayh, was produced between the middle of the tongue and the middle of the hard palate in eighth-century CE Classical Arabic (Sibawayh 1982: 433). This description is interpreted either as a voiced palatal occlusive (Gairdner 1925: 23; Fischer and Jastrow 1980: 105; Watson 1992: 73) or as a voiced palatalized velar occlusive (Schaade 1911: 73; Rabin 1951: 31, 126; Cantineau 1960: 58); I conjecture that Arabic *šīn* and *jīm* at this time constituted a voiceless–voiced palatal near pair, **ç–*ɟ*.

As a result of changes in the articulation of the non-emphatic lateral fricative, **ɬ*, and the voiced velar stop, **g*, the eighth-century CE Arabic described by Sibawayh exhibited the three voiceless, voiced, emphatic triads in the coronal set shown in Figure 1.2 (cf. Rabin 1951: 209, n. 7).

1.1.2 *Morphology*

One of the main distinguishing features of Semitic languages is their root-and-pattern morphology. The root is a semantic abstraction consisting of two, three, or (less commonly) four consonants from which words are derived through the superimposition of templatic patterns (Holes 1995: 81). In Arabic, the root √KTB has the broad lexical sense of 'writing' from which the words for 'book' (KiTaaB), 'written' (MaKTuuB), 'writer' (KaaTiB), 'office' (maKTaB) and 'document' (KaTiiBa) are derived. Nouns have feminine and masculine gender, and singular and plural number, and also dual in some Semitic languages. Adjectives are morphologically like nouns. Predicative adjectives agree with the noun subject in

[3] There is evidence that pre-Classical Arabic and other dialects of early Arabic had a lateral fricative. These include some second-century BCE to third-century CE inscriptions from Qaryat al-Faw, near modern Sulayyil, which 'are written in fine monumental South Arabian script, capable of expressing the phonetic features of Arabic unambiguously' and which 'attest the preservation of *š* (s^1) and *s* (s^2)' (Lipinski 1997: 73–4). Steiner considers the pair of doublets, *qišda* and *qilda*, in *Lisān al-ᶜArab*, evidence 'that at an earlier period (or in a different dialect) Arabic *šīn* was a fricative-lateral' (Steiner 1977: 95).

TABLE 1.1 Semitic subject markers

	Prefixed/Suffixed		Suffixed	
	Singular	Plural	Singular	Plural
1.	*ʔa-*	*ni-*	*-ku*	*-na*
2m.	*ta-*	*ta- . . . -u:*	*-ta*	*-tuma:*
2f.	*ta- . . . -i:*	*ta- . . . -a:/na*	*-ti*	*-tin(n)a*
3m.	*ya-*	*ya- . . . -u:*	*-a*	*-u:*
3f.	*ta-*	*ta- . . . -u:/na*	*-at*	*-a:*

gender and number.[4] Attributive adjectives agree with the attributed noun in gender, number, case, and definiteness. Semitic languages typically have three sets of pronominal forms: independent subject pronouns, and bound possessive and object pronouns, which are suffixed to nouns and verbs respectively. Verbs have two conjugations for the subject: prefixes and suffixes for the non-past tense (also described as the imperfect aspect), and suffixes only for the past tense (also described as the perfect aspect). The Semitic subject markers are laid out in Table 1.1 (from Hetzron 1992: 414).

In Central Semitic (including most dialects of Arabic), *-k* of the first person singular suffix was replaced by *-t*, while *-t* of the second person suffixes was replaced by *-k* in South Semitic (Faber 1997: 11).

Three other typical morphological Semitic features which are found in Standard Arabic today are the following endings on nouns and verbs (from Holes 1995: 41):

(1) (a) A set of final short vowel endings suffixed to the noun to indicate case;
(b) A set of final short vowel endings suffixed to the verb to indicate mood;
(c) A final nasal ending *-n*, (*tanwīn*), suffixed to the noun to indicate indefiniteness.

These endings have all but disappeared in modern Arabic dialects, though some dialects spoken in the Arabian peninsula, including dialects of the Yemeni Tihama and dialects spoken around Abha in Saudi Arabia, preserve a vestige of *tanwīn* (Greenman 1979; Behnstedt 1985: 60; Al-Azraqi 1998: 71–6).

1.1.3 *Syntax*

Although in Ethiopian Semitic the unmarked word order is S(ubject) O(bject) V(erb) (for example, Tigre; Raz 1997: 455), the original typical[5] word order in Semitic languages was V(erb) S(ubject) O(bject). For modern Arabic, as in

[4] In Standard Arabic, adjectives inflect for singular, dual, and plural number. In recorded modern dialects of Arabic, adjectives inflect for singular and plural number only.

[5] Zaborski (p.c.) points out that word order was not fixed: Proto-Semitic had full nominal inflections and the word order was more or less free with different variants.

Hebrew, it has been argued that the VSO word order is changing towards SVO (Loprieno 1995: 3, for instance); however, in San'ani and certain other, particularly bedouin, dialects of the Peninsula, word order is often dependent on factors such as the dynamism of the verb (dynamic verbs are more likely to occur before a noun subject than stative verbs), the text type (narratives with distinct events are more likely to have verb-initial clauses), and stylistics (Holes 1995: 210–11; Dahlgren 1998; Watson 2000: 11–15). Within phrases, a word which functions as the qualifier typically follows the qualified term. Thus, an adjective follows the noun it qualifies, as in the Standard Arabic noun phrase:

(2) *al-baytu l-kabīru*
the-house the-large
'the large house'

and an object or complement follows the verb it complements, as in the Standard Arabic verb phrase, as in (3) and (4).

(3) *kataba kitāban*
wrote-he book-indef.
'he wrote a book'

(4) *ʔaṣbaḥa kātiban*
became-he writer-indef.
'he became a writer'

1.2 ARABIC WITHIN CENTRAL SEMITIC

Within the Semitic language family, it has traditionally been claimed that Arabic belongs to the South-Semitic or South-West Semitic branch as a sibling of Modern South Arabian and Ethiopian Semitic on the basis of three common factors:

(5) (a) Almost total preservation of the proto-Semitic sound system with the exception that **p* lenited to *f*, and **š* merged with **s*^{3} (Arabic *šīn* = proto-Semitic **s*^{2});
(b) the derived *fāᶜala* and *istafᶜala* patterns in the verb;
(c) the formation of the plural of nouns by internal vowel changes, as in the following examples from Arabic:[6]

(6)

Singular	*Plural*	*Gloss*
madrasat-un	*madāris-u*	'school/schools'
maktab-un	*makātib-u*	'office/offices'
miftāḥ-un	*mafātīḥ-u*	'key/keys'

[6] More recent research, however, has argued that the derived *fāᶜala* form and the internal plurals go back to Proto-Afroasiatic, and therefore cannot be a feature of South-West Semitic only (Zaborski 1994, 1997).

On the basis of shared morphological innovations, however, Hetzron (1972, 1992) and others (Faber 1997, for instance) have proposed that it is more plausible to group Arabic as a sibling of North-West Semitic (including Hebrew, Ugaritic, Deir Alla and Aramaic) within a Central Semitic branch. Faber lists the following features which are peculiar to Central Semitic (Faber 1997: 8–9):

(7) (a) The realization of the emphatics as pharyngealized rather than glottalized;
(b) generalization of *-t* in the suffix conjugation verb to give *katab***tu** 'I wrote' and *katab***ta** 'you m.s. wrote' (cf. 1.1.2);
(c) a non-geminate prefix conjugation *yaqtul* for the non-past which replaced the inherited **yaqattal* non-past;
(d) development of a compound negative marker **bal*;
(e) within-paradigm generalization of vowels in the prefix conjugation: in Akkadian, the four prefixes which occur in active, non-derived prefix conjugation verbs are *ʔa-*, *ta-*, *ni-* and *yi-*, and Hetzron (1973) suggests that this **a–i* alternation reflects the Proto-Semitic state of affairs. In Central Semitic, however, all prefixes for a verb stem have the same vowel—either *a* or *i*—depending on the voice of the verb and, in Hebrew, the phonological shape of the verb stem.

Other features traditionally agreed to be shared by Arabic with North-West Semitic include the formation of the masculine plural suffix *-īn*, the internal passive, a definite article which developed out of the same demonstrative element before language separation, and the *puᶜayl* diminutive (Versteegh 1997: 17).

1.2.1 *The spread of Arabic*

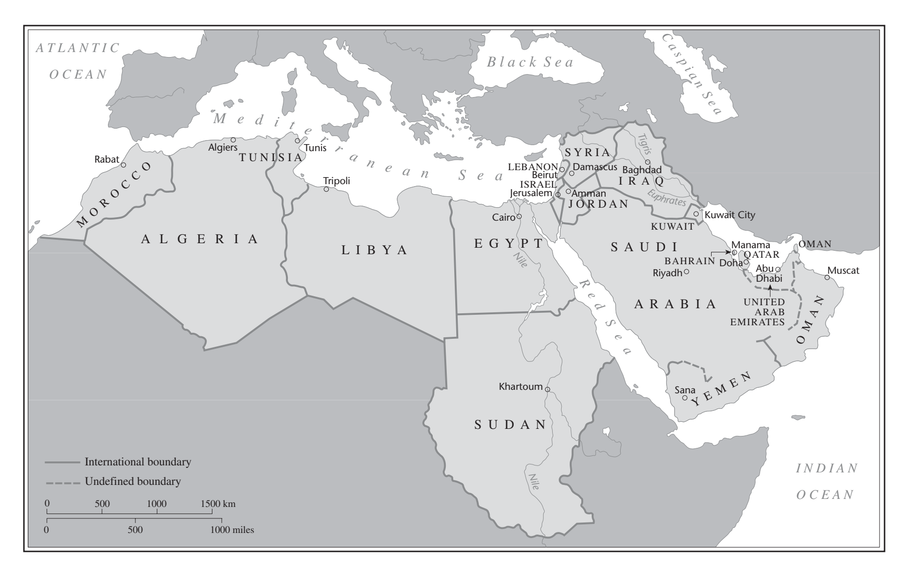
The original homeland of speakers of Arabic is the central and northern regions of the Arabian Peninsula. The lower half of the Arabian Peninsula was inhabited by speakers of languages known as Epigraphic South Arabian (Hetzron 1992: 412). The end of the sixth century CE, however, saw the rise of the new religion of Islam promoted by the Prophet Muhammad within the Arabian Peninsula in what is now Saudi Arabia. The new Islamic state spread rapidly throughout the Peninsula, and within 100 years had extended north into the Levant, east into Iraq and Khuzistan, and west into North Africa. Over the centuries, the religious frontiers of Islam stretched into Spain, Africa, India, and Indonesia, and across central Asia into Turkestan and China (Gibb 1978: 10). The rise and expansion of Islam was not only a religious and hence cultural conquest, but also a linguistic conquest, and within a few hundred years Arabic became both the official and the vernacular language of all Islamicized countries in the Middle East. Indeed, due to the prevailing tolerance on the part of the Muslims to Christians and Jews, arabicization was more complete a process and progressed at a greater rate than islamicization (Versteegh 1997: 93).

In the course of the spread of Islam, Arabic found itself in contact with a series of foreign languages which it has tended to supplant. In Egypt during the early

centuries of Islamic domination, the Coptic patriarchs communicated with the Arab conquerers through interpreters. By the tenth century CE, the Coptic bishop Severus of Eshmunein complained that most Copts no longer understood either Greek or Coptic, only Arabic. In Upper Egypt, Coptic was limited to a few small pockets in the countryside and to the clergy in monasteries by the fourteenth century CE (Versteegh 1997: 95). It is generally believed that by the sixteenth century CE the use of Coptic was restricted to liturgy in the Coptic church (cf. Loprieno 1995: 7). In North Africa, Arabic became the dominant language of the cities, but Berber managed to resist the spread of Arabic in the rural interior. In Morocco and Algeria, in particular, Berber has retained its vitality alongside Arabic to this day. Likewise in limited areas in the Fertile Crescent, dialects of Syriac have persisted and have influenced neighbouring Arabic dialects.

1.2.2 *The development of Arabic*

The Arabic of today is derived principally from the old dialects of Central and North Arabia which were divided by the classical Arab grammarians into three groups: Hijaz, Najd, and the language of the tribes in adjoining areas. Of these, the language of the Hijaz was considered to be the purest, while that of the neighbouring tribes was felt to have been considerably contaminated by other Semitic and non-Semitic languages. It has been estimated recently that Arabic is the native language of about 200 million people (Holes 1995: 1). Arabic is the sole or joint official language in twenty countries in a region stretching from Western Asia to North Africa. These are Morocco, Algeria, Mauritania, Tunisia, Libya, Egypt,



MAP 1. Countries of the Arab world

Sudan, Djibouti, Somalia, Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates, Oman, Yemen, Jordan, Syria, Iraq, and Lebanon. It is spoken by Israel's Palestinian population and by Palestinians living in the Occupied West Bank and Gaza. It also has speakers in the south-western corner of Iran, in southern Turkey, in Chad, in some areas in the south of the Sahara, in some enclaves of the Central Asian republics of the old Soviet Union, in francophone West Africa, and among Arab communities in Europe and America.

1.2.3 *The emergence of a standard language and diglossia*

The literary Arabic language began to attain a standard form through the development of grammatical norms in the eighth century CE (Fischer 1997: 188). This standard language can be termed Standard Arabic, the terms Classical Arabic and Modern Standard Arabic being used to describe its medieval and modern variants, respectively.[7] Classical Arabic was based primarily on the language of the western Hijazi tribe of Quraysh, with some interference from pre-Islamic poetic koiné and eastern dialects. The language was codified in the Qur'an, the holy book of Islam. Although the lexis and stylistics of Modern Standard Arabic are rather different from those of Classical Arabic, the morphology and syntax have remained basically unchanged over the centuries (Fischer 1997: 188). The vernacular Arabic dialects, by contrast, have developed markedly during this period. Like a number of other languages, therefore, Arabic came to have one standard variety and a large number of regional and social dialects. Unlike many such languages, however, no one in the Arab world is brought up speaking Standard Arabic as their mother tongue:[8] an Arab child's mother tongue will be the regional or social variety of Arabic of its home region, while Standard Arabic, if it is mastered at all, is learnt formally at school or at home as part of the child's education. Standard Arabic is confined to formal written and spoken occasions, and the regional/social variety of Arabic is used at all other times. Standard Arabic now differs considerably from regional and social colloquial varieties of Arabic in terms of its phonology, morphology, syntax, and lexicon. According to Lipinski (1997: 75), such diglossia in Arabic began to emerge at the latest in the sixth century CE when oral poets recited their poetry in a proto-Classical Arabic based on archaic dialects which differed greatly from their own (cf. also Vollers 1906; Wehr 1952; Diem 1973, cited in Fischer 1997: 188).

Dialects of Arabic form a roughly continuous spectrum of variation, with the dialects spoken in the eastern and western extremes of the Arab-speaking world being mutually unintelligible. On the basis of certain linguistic features, Arabic

[7] In this book, the term Standard Arabic is used when referring to the literary language in general; the terms Classical and Modern Standard Arabic are used for specific reference to the ancient or modern varieties of the language, respectively.

[8] The Hijazi dialect has developed markedly since the development of Classical Arabic, and Modern Standard Arabic is quite distinct from the modern dialect of Hijaz (Beeston 1970: 14).

dialects can be divided into two major geographical groups: the first comprises dialects spoken east of a line running from Salum in the north to roughly the Sudan–Chad border in the south; the second comprises the Maghribi dialects spoken to the west of this line. The main phonological features which distinguish the western dialect group from the eastern include the typical reduction of the triangular system of short vowels, *a*, *i*, *u*, which is found in eastern dialects, to a two-vowel system (Fischer and Jastrow 1980: 33); and a contrast between an iambic word-stress system in the western group and a trochaic word-stress system in the eastern group. Thus, a word such as *katab* 'he wrote' will be typically stressed as *kaˈtab* in western dialects, but as *ˈkatab* in eastern dialects.[9] In western dialects, the combination of an iambic stress system together with a tendency to delete unstressed vowels leads to word-initial consonant clusters which are not typically attested in eastern dialects: in the Moroccan Arabic dialect of Lmnabha, *smin* 'fat' (Elmedlaoui 1995: 139) is the cognate of Cairene *simīn*; and the word for 'outside' is realized as *bṛṛa* in Lmnabha (Elmedlaoui 1995: 157), but as *baṛṛa* in Cairene.

Dialects of a language which has speakers as ethnically and socially diverse as Arabic, however, cannot be divided in purely geographic terms. Dialects are also commonly distinguished along a bedouin–urban axis: bedouin dialects tend to be more conservative and homogenous, while urban dialects show more evolutive tendencies and usually exhibit fairly clear intra-dialectal variation based on age, gender, social class, and religion. Typical bedouin features include the voiced reflex of Classical Arabic *qāf*, preservation of the Classical Arabic interdentals, and a gender distinction in the second and third persons plural of the verb, pronouns, and pronoun suffixes (Versteegh 1997: 144). Distinctions between bedouin and urban dialects appear to be less marked in the East, however, particularly in the Peninsula, than they are in North Africa (Fischer and Jastrow 1980: 24).

1.3 THE PRESENT STUDY

Most accounts of the phonology and morphology of Arabic are fragmentary, with the information given in unpublished theses, journal articles, and works which address particular aspects of phonology or morphology taking examples from Arabic. In this book, I seek to provide a more comprehensive and integrated account. I focus on two dialects from the eastern group: Cairene, and the dialect spoken within the old city of San'a (the capital of the Republic of Yemen). Where relevant I draw comparisons with Standard Arabic, and other modern varieties of near-eastern Arabic, including Central Sudanese, Palestinian, the Saudi Arabian dialect of Abha and other dialects of Yemeni Arabic.

[9] There are, however, a number of eastern dialects (including that of the Negev Bedouin) and some dialects spoken in Upper Egypt and Oman, in which iambic stress is attested today (Fischer and Jastrow 1980: 59–60).

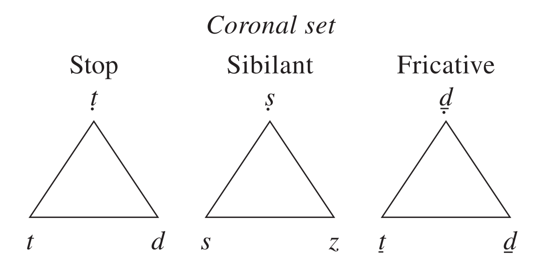


FIGURE 1.3. San'ani triads

San'ani is a dialect of the Arabian Peninsula, an area which has received little attention in generative work on the phonology and morphology of Arabic. It is closer to the descriptions we have of Classical Arabic than is Cairene. It also has considerably fewer speakers (circa 100,000 as opposed to a probable figure of over 12 million speakers of Cairene). Partly as a result of this and partly as a result of its history and tenacious hold on its own traditions, San'ani has experienced a far slower rate of linguistic change than Cairene. In many respects, the dialect is very conservative, exhibiting a number of features of phonology, morphology, and syntax typically considered rural or bedouin (cf. Fischer and Jastrow 1980: 24). The reflex of the Classical Arabic phoneme *qāf*, for example, is a voiced velar /g/, and the reflex of Classical Arabic *jīm* a palatoalveolar affricate /ʤ/; the original form II *fiᶜᶜāl* and form V *tifiᶜᶜāl* verbal noun patterns are more commonly used than the *tafᶜīl* and *tafaᶜᶜul* patterns found in Modern Standard Arabic; verb-initial as opposed to subject-initial clauses are typically used in narrative texts (cf. Holes 1995: 210); and in possessive constructions direct annexion is often favoured over the use of an 'of' word (*ḥagg* in San'ani)[10] (cf. Versteegh 1997: 143). In its consonantal phoneme system, San'ani maintains the triadic opposition attested in eighth-century CE Classical Arabic between voiceless, voiced, and emphatic consonants in three sub-sets of the coronal set—see Figure 1.3.

In contrast to San'ani, Cairene is an innovative, urban dialect. It has maintained the voiceless uvular stop /q/ in religious terminology and other loan words from Standard Arabic, and through the influence of foreign languages has gained seven additional marginal or quasi-phonemes. These are the emphatic /ḷ/ used almost exclusively in the word *aḷḷāh* 'God' (cf. Testen 1997: 219–20) and derivatives, as in the majority of Arabic dialects, the emphatics /ṛ/, /ḅ/ and /ṃ/, the voiceless bilabial stop, /p/, and the voiced palatoalveolar fricative, /ž/, and labio-dental fricative, /v/.

Through merger, Cairene has lost the Classical Arabic interdental phonemes *ṯ, *ḏ, and *ḏ̣. This historical loss of the interdental fricatives has led Cairene to

[10] For example, 'my house' translates more commonly in San'ani as *baytī* 'house-my' than as *al-bayt ḥaggī* 'the-house of-me'.

	Stops		Sibilants	
Emphatic	*ṭ*	*ḍ*	*ṣ*	*ẓ*
Non-emphatic	*t*	*d*	*s*	*z*
	voiceless	voiced	voiceless	voiced

FIGURE 1.4

develop a four-way distinction for two sub-sets of the coronal set:[11] voiceless-plain, voiced-plain, voiceless-emphatic, voiced-emphatic, as in Figure 1.4.

In terms of word-stress, Cairene contrasts with San'ani and the majority of other eastern dialects of Arabic which exhibit trochaic word-stress systems (for example, Classical Arabic, Central Sudanese, Palestinian, Saudi Arabian dialects) in its treatment of peripheral feet. In a word comprising more than a single binary metrical foot, such as *madrasa* 'school', stress is assigned to the head of the final, peripheral foot in Cairene to give *mad'rasa* 'school'. In San'ani, the final foot is deemed extrametrical and is therefore not taken into account in word-stress assignment. Thus, stress in San'ani is assigned to the rightmost non-extrametrical foot to give *'madrasih* 'school'.

In terms of its morphology, Cairene contrasts with Proto-Semitic, Classical and Modern Standard Arabic, San'ani, and a number of other bedouin-type Peninsula dialects in making no gender distinction in the second and third person plural independent and bound pronouns. Thus, while San'ani has the pronouns *antayn* 'you f.pl.' and *antū* 'you m.pl.', *hum* 'they m.' and *hin* 'they f.', Cairene simply has *intu*(*m*) 'you pl.' and *humma* 'they' to refer to both genders. Cairene has an enriched concatenative nominal morphology due in large measure to extended contact with other languages and cultures. In addition, much of its non-concatenative morphology has been simplified, particularly in the derivation of verbal participles of derived verbs: where the active participle was once distinguished from the passive participle by the final stem vowel (*i* for active, *a* for passive), today the active participle of most derived verbs is distinguished from the passive participle by syntactic or pragmatic context alone. However, the loss of non-concatenative morphology in one part of the morphology is occasionally balanced by the development of non-concatenative morphology in another. In common with many eastern urban dialects of Arabic, Cairene has long since lost the apophonic (or internal) passive (Retsö 1983): thus, 'a letter was written' is *kutibat risālatun* in Standard Arabic with the /u-i/ vocalism of the verb indicating perfect passive, while in Cairene it is *itkatab gawāb* with the passive indicated by affixation of a passive prefix to the

[11] In Cairene, *qāf* lost its dorsal articulation historically to become a glottal stop, /ʔ/; thus, although the Cairene reflex of *jīm* is a voiced velar plosive, /g/, as in Proto-Semitic (see Table 1.1), and the voiceless velar stop, **k*, has been preserved as such, the Proto-Semitic dorsal triad */g, k, q/ was also lost in Cairene.

basic verb. By contrast, a number of simple intransitive verbs are distinguished from their transitive counterparts, not by a different verbal form, as in many other eastern dialects of Arabic, but by a palatal (/i/) versus a guttural (/a/) vocalism (cf. Willmore 1905: 120, 121).[12] Consider the paired examples in (8).

(8)	*bi*^{c}*id*	'to be/become distant'	*ba*^{c}*ad*	'to take away, remove'
	ti^{c}*ib*	'to be/become tired'	*ta*^{c}*ab*	'to tire, wear out'
	ḥimi	'to be/become hot'	*ḥama*	'to heat'

The present work, therefore, is a study of the phonology and morphology of one progressive and one conservative near-eastern dialect of Arabic. The two dialects have a number of similarities which enable us to classify them on one level as a group. As we have seen, these include a trochaic stress system, and the presence of a short vowel triad, /a, i, u/. Other similarities include the same basic syllable inventory, and a simplex vocalic melody in basic form I verb stems. Differences between the two dialects include, as discussed, the consonantal phoneme inventories, the treatment of peripheral feet in the stress system, and the presence or absence of gender distinction in second and third person plural independent and bound pronouns. Other differences include the number of long vowels (five in Cairene, three in San'ani), the identity of the default vowel (/a/ in San'ani, /i/ in Cairene), and the tolerance or intolerance of the dialect to initial consonant clusters.

[12] In many cases at least, the /a/ type verb represents a restructured form IV.

2

THE PHONEME SYSTEM OF ARABIC

This chapter considers the development of the phoneme system in Arabic and establishes the phoneme systems for present-day San'ani and Cairene. I begin by considering the consonantal system of Classical Arabic as recorded by the founding father of Arabic grammar, the eighth-century CE Arab grammarian, Amr ibn Uthman ibn Qanbar Sibawayh. Having established the consonantal system of Classical Arabic, I look at reflexes of the Classical Arabic consonantal phonemes in modern dialects of Arabic. I then consider the consonantal system of San'ani and Cairene, showing that San'ani is far closer than Cairene in terms of its consonantal system to what we believe to have held for Classical Arabic. Finally, I consider the vocalic systems of Classical Arabic, and then of San'ani and Cairene.

2.1 CONSONANTS

By the time of the eighth century CE, Classical Arabic had twenty-eight consonantal phonemes in nine places of articulation. The most probable articulations of these phonemes are shown in Table 2.1. In all modern Arabic dialects, there has been a change in the number and pronunciation of the consonantal phonemes. Dialects which have exhibited most innovation in terms of pronunciation are the urban dialects spoken outside the Arabian Peninsula. Nomadic dialects and dialects of

TABLE 2.1 Consonantal phoneme inventory for eighth-century CE Classical Arabic

	Labial	Labio-dental	Inter-dental	Dental-alveolar	Palatal	Velar	Uvular	Pharyn-geal	Laryn-geal
Plosive	b			t, d	ɟ/g^j	k	q		ʔ
emphatic				ṭ					
Fricative		f	ṯ, ḏ	s, z	ç		χ, ʁ	ḥ, ^{c}	h
emphatic			ḏ̣	ṣ					
Nasal	m			n					
Lateral				l					
emphatic				ḍ					
Tap				r					
Glide					j	w			

Note: The classical Arab grammarians included *alif* (/ā/) to give twenty-nine phonemes (Sibawayh 1982: 431; Al-Nassir 1993: 11).

the Peninsula tend to retain most features of the Classical Arabic phoneme inventory.

2.1.1 *Bilabials*

The bilabials **b* and **m* have been maintained in all modern Arabic dialects. In some dialects, /b/ has a voiceless counterpart, /p/, used in loan words from languages such as Persian and French which have a voiceless bilabial stop in their inventories. A few dialects, including Cairene, have an emphatic labial nasal marginal phoneme /ṃ/ and a voiced emphatic labial marginal phoneme /ḅ/.

2.1.2 *Labio-dental*

The labio-dental, **f*, is maintained in all dialects. A few dialects, including Cairene, have a voiced quasi-phoneme /v/ which is usually restricted to loan words, such as *villa* 'villa', and generally found only in the speech of educated speakers.

2.1.3 *Dentals*

The four dental stops of Classical Arabic, **t*, **d*, **ṭ*, **n* have been maintained in all dialects. Dialects in which the interdentals have been lost (see Section 2.1.4) now have two plain and two emphatic dental plosives, /t, d, ṭ, ḍ/. The nasal stop, /n/, has a pharyngealized counterpart in a few modern dialects, including Lebanese (Nasr 1959*a*: 203). In most dialects, /t/ and /d/ are produced against the top of the upper incisors and are often difficult for English speakers to distinguish from the interdentals /ṯ/ and /ḏ/. The emphatic voiceless dental plosive **ṭ* may well have been voiced in Classical Arabic, but is pronounced as a voiceless pharyngealized dental stop in almost all dialects today. In some Yemeni dialects spoken in the Central plateau, including San'ani (Jastrow 1984; Behnstedt 1985: 46; Watson 1993*b*: 9), however, the phoneme is voiced in word-initial and intervocalic positions, as in:

(1)	*Underlying form*	*Realization*	*Gloss*
	/ṭawīl/	[*ḍ*]*awīl*	'tall, long'
	/maṭābix/	*ma*[*ḍ*]*ābix*	'kitchens'

In some sedentary dialects of Algeria and Morocco, the plain voiceless dental stop is palatalized or affricated (Fischer and Jastrow 1980: 49). Among certain speakers of Cairene (particularly women), degrees of palatalization are attested in all four dental plosives and the dental nasal /n/ in the environment of palatal vocoids (Haeri 1997).

2.1.4 *Interdentals*

In nomadic dialects, sedentary dialects in the Arabian Peninsula (including the dialects of Yemen considered in this study), and rural sedentary dialects of Tunisia,

Palestine, Syria, and Mesopotamia, the interdental fricatives have been maintained.

In the sedentary dialects of Egypt, the large cities of Syria and Lebanon and many neighbouring areas, the original interdental fricatives *ṯ, *ḏ and *ḏ̣ merged with the dental stops *t, *d, *ḍ. In a very few words, of which *ẓābiṭ* 'officer' and *ẓālim* 'tyrant, oppressor' are two, Cairene has an emphatic voiced alveolar fricative (that is, sibilant) variant of Classical Arabic *ḏ̣. In loan words from Standard Arabic generally, Cairene has sibilant reflexes of the original interdentals—namely, *sābit* 'firm' (< **ṯābit*), *hāza* 'this' (< **hāḏā*) and *ẓarf* 'envelope' (< **ḏ̣arf*).

Several northern Mesopotamian dialects in Arab Afghanistan and Uzbekistan have sibilant reflexes, /s, z, ẓ/, of the Classical Arabic interdentals (Fischer and Jastrow 1980: 50).

In southern Anatolian Siirt, the original interdentals have become labiodentals /f, v, ṿ/, as in: *fa^{c}lab* 'fox' (< **ṯa^{c}lab*), *vahab* 'gold' (< **ḏahab*), *ṿarab* 'he hit' (< **ḏ̣arab*) (Fischer and Jastrow 1980: 50).

2.1.5 *Sibilants*

The sibilants *z, *s, *š, and *ṣ have maintained their phonemic status in most dialects; however, the modern dental pronunciation of /s/ must post-date Sibawayh's time since descriptions of eighth-century CE Classical Arabic *sīn* suggest it had a realization more like modern-day *šīn*, which was itself probably pronounced as a voiceless palatal fricative, [ç] (Lipinski 1997: 124; Watson 1992: 73–4). The move of *šīn* from a palatal fricative to a palatoalveolar fricative probably took place because of the general instability of palatal fricatives (Watson 1999*c*; Watson and Dickins 1999): only 5 per cent of the world's languages today have /ç/ in their phoneme inventory (Ladefoged and Maddieson 1996: 165). In a few dialects spoken in the Maghrib (e.g. Meknes, Heath 1987: 15), and in Farafra and Central Bahariyya spoken in the oases of the western desert of Egypt, *s and *z have merged with *š and *ž (the latter derived from *jīm*) to give sometimes /s/ and /z/, and sometimes /š/ and /ž/ (Fischer and Jastrow 1980: 50). The emphatic voiceless dental–alveolar sibilant, *ṣ, has been mainly retained in the dialects, although in a number of dialects spoken in Sudan and in some dialects spoken in the western mountain range of northern Yemen, /ṣ/ has lost some of its emphasis and is, in certain contexts, barely distinguishable from /s/. In some Sudanese dialects, *ṣ has disappeared altogether. In a few dialects of Yemeni Arabic spoken around the northern province of Sa'dah, the reflex of *ṣ is /st/[1] (Behnstedt 1987: 7).

2.1.6 *Palatals*

The phoneme known as *jīm*, which was realized either as a voiced palatal stop (Gairdner 1925: 23; Fischer and Jastrow 1980: 105; Watson 1992: 73) or as a

[1] In Modern Hebrew, the reflex of *ṣ is /ts/ (Hetzron 1992: 413).

voiced palatalized velar stop (Schaade 1911: 73; Cantineau 1960: 58) in early Classical Arabic, is realized in most dialects today as a voiced palatoalveolar affricate or velar stop. It has the reflex /ʤ/ in most Bedouin dialects, in many rural Syrian, Jordanian, Palestinian, and Mesopotamian dialects (Holes 1995: 61), and in the central region of northern Yemen (Behnstedt 1985: 42). In Cairene and in Yemeni dialects spoken in Ta'izz and in the Hugariyyah, the phoneme is realized as a voiced velar stop, /g/, as was probably the case in proto-Semitic (see Section 1.1.1) and early pre-Classical Arabic. The phoneme is realized as a voiced palatal stop, /ɟ/, in parts of the Arabian Peninsula, including some northern Yemeni dialects (Behnstedt 1985: 42), Upper Egypt and parts of Sudan (Fischer and Jastrow 1980: 105). In the Syrian desert, Khuzistan, Hadramawt, Dhofar, and the Gulf dialects, the sound has lenited to a palatal glide, /j/. In many areas of the Levant, especially the major cities of Beirut, Damascus, and Jerusalem (Holes 1995: 61) and in the majority of Maghribi dialects (cf. Heath 1987: 20–1 for Moroccan), the phoneme does not have an initial occlusive element and is realized as /ž/.

2.1.7 *Liquids*

The lateral **l* has been maintained in all dialects. In most modern Arabic dialects, /l/ has an emphatic counterpart /ḷ/. In many of these dialects, /ḷ/ is found exclusively in *aḷḷāh* 'God' and derivatives. In some southern Yemen dialects, including that of Ghaylḥabbān (Habtoor 1989: 31–3), the Classical Arabic emphatic lateral fricative articulation of *ḍād* is preserved as an allophone[2] of *ḍād* and, according to Habtoor, is indistinguishable from the emphatic /ḷ/ in *aḷḷāh* 'God'. The dental tap **r* is maintained in most dialects. However, in some Iraqi dialects (Blanc 1964; Johnstone 1975), the reflex of **r* is a voiced post-velar fricative, similar to Parisien /r/. A number of dialects have an emphatic variant of /r/, /ṛ/, whose distribution is sometimes determined by phonological context and for which several (near-) minimal pairs with plain /r/ are attested, as in Cairene: *ṛāgil* 'man' versus *rākib* 'rider, passenger', *ʔaṛa* 'he read' versus *bara* 'he sharpened', *baṛṛi* 'my land' versus *barri* 'pertaining to land', *šaṛʿi* 'legal' versus *šarʿi* 'my street'. In several dialects, including San'ani, in which /r/ cannot be described as pharyngealized, /a/ has a back articulation preceding /r/, as in *sārah* 'Sarah' and *jāratī* 'my neighbour f.', but a front articulation following /r/, in words such as *rāgid* 'sleeping'.

2.1.8 *Velars*

The voiceless velar stop, **k*, has been retained in most Arabic dialects. In Central Palestine it has become a palatoalveolar affricate /č/ (Holes 1995: 60), and in certain dialects spoken in the North of the Peninsula, in Jordan and in Iraq, /k/ has the

[2] The phoneme is realized as a pharyngealized lateral fricative, unless there is a liquid in the same word. Where a liquid occurs, *ḍād* dissimilates to a voiced emphatic interdental fricative, as in: *ḏ̣alam* 'il a fait du tort' and *ḏ̣arab* 'il a fusillé' (Habtoor 1989: 32).

fronted allophone [č] in the environment of front vowels. In most dialects, including Cairene and San'ani, /k/ has a voiced counterpart, /g/, which is a reflex of the early Classical Arabic voiced palatal stop in Cairene, and a reflex of the Classical Arabic voiceless uvular stop in San'ani.

2.1.9 *Uvulars*

The original uvular stop, **q*, is maintained in many Syrian and North African dialects, in the North Mesopotamian *qeltu* dialects (Fischer and Jastrow 1980: 52), and, with a number of contextually determined allophones ([x, ġ, q]), in sedentary dialects spoken in the west and south of the Arabian Peninsula (Behnstedt 1985: 41). It has a glottal-stop reflex in the large cities around the Mediterranean, including Cairo, Jerusalem, Damascus, and Beirut (Fischer and Jastrow 1980: 52; Holes 1995: 59). In many dialects in which the reflex of **q* is a glottal stop, however, certain religious and Standard Arabic words are pronounced with a voiceless uvular stop, as in the following examples from Cairene:

(2) *il-qāhira* 'Cairo'
il-qurʔān 'the Qur'an'
qarn 'century'
qawmi 'national'
qarya 'village'

In many regions of rural Palestine, the reflex of **q* is a voiceless velar stop, and **k*, which is most commonly realized as a voiceless velar stop in other dialects of Arabic, has the reflex /č/ (Fischer and Jastrow 1980: 52; Holes 1995: 60). In Bedouin dialects and the dialects spoken in the central region of northern Yemen, including San'ani, the reflex of **q* is a voiced velar stop, /g/.[3] A vestige of the original uvular articulation of /g/ is seen in the back articulation of surrounding /a/ vowels in these dialects. Thus, the vowel quality of /ā/ in *gāl* 'he said' and *ʔigāmih* 'residence' in San'ani is the same as that in *ḥāl* 'condition, state' and *ṣām* 'he fasted', and contrasts with the front vowel quality of /ā/ in *kāl* 'he measured'. In a few dialects spoken in western regions of northern Yemen, the reflex of **q* is a voiced uvular stop, /G/ (Behnstedt 1985: 41). In Central Sudanese, **q* in loans from Standard Arabic is interpreted as /ġ/ (Sudanese /ġ/ being realized as [ġ] in most positions, but as [q] word finally) (J. Dickins p.c.).

The uvular fricatives are mainly maintained, although for many dialects they are phonetically and phonologically better described as velar (Fischer and Jastrow 1980: 52) or post-velar (e.g. Cairene, cf. Abdel-Massih 1975: 4). In Maltese, the reflex of *χ is /ḥ/ and *ʁ and *ᶜ have merged and collapsed to be realized only in the pharyngealization of surrounding vowels (Fischer and Jastrow 1980: 52) if at all (Vanhove 1993: 9). In some dialects spoken in the western mountain range

[3] Vollers observed that wherever *qāf* is voiced, *jīm* has a palatal (or palatoalveolar) articulation (Vollers ZDMG xlix, 495, cited in Rabin 1951: 126).

of northern Yemen, *ʁ has merged with *^{c} and in different dialects has a reflex of either /^{c}/ or /ʔ/. In an area to the north of San'a, *ʁ is realized as a voiceless uvular fricative; and in a few Yemeni dialects spoken in villages close to the Saudi border, the reflex of this phoneme is a voiceless uvular stop, /q/ (Behnstedt 1985: 44).

2.1.10 *Pharyngeals*

The pharyngeals *^{c} and *ḥ have generally been maintained in non-peripheral Arabic dialects. In dialects spoken in the central and northern Yemeni Tihama, however, *^{c} has been reduced to a glottal stop /ʔ/ (Greenman 1979; Behnstedt 1985: 43). In Maltese, *^{c} (merged with *ʁ, cf. Section 2.1.9) has been reduced to a virtual phoneme which does not always correspond to an acoustic fact (Vanhove 1993: 9). In a number of peripheral Arabic dialects, including Nigerian and Chadian, *^{c} and *ḥ have been de-pharyngealized to /ʔ/ and /h/ respectively (Owens 1993: 118).

2.1.11 *Glottals*

The glottal stop, known as *hamza* in Arabic, was attested in all prosodic positions in Classical Arabic: word-initially, as in *ʔakal* 'he ate'; intervocalically, as in *saʔal* 'he asked' and *suʔāl* 'question'; pre-consonantally, as in *raʔs* 'head'; post-consonantally, as in *badʔ* 'beginning'; and post-vocalically, as in *xaḏ̣rāʔ* 'green f.'. Today, the glottal stop has weakened in the majority of Arabic dialects. It is usually attested between two identical short vowels,[4] as in Cairene *saʔal* 'to ask' and *siʔim* 'to become weary'; between two vowels of differing quality the glottal stop is usually replaced by a glide, as in *suwāl* 'question' < **suʔāl* and *rāyiḥ* 'going' < **rāʔiḥ*; and in post-vocalic word-final position it has been lost, as in *xaḍra* 'green f.' < **xaḏ̣rāʔ*. With the exception of several Peninsula dialects, including many spoken in Yemen (Jastrow 1980: 106–7; Watson 1989: 219–28), the glottal stop has been replaced by compensatory lengthening of the vowel in pre-consonantal position, as in Cairene *rās* 'head' < **raʔs* and *dīb* 'wolf' < **ḏiʔb*. The reflexes of a number of common Standard Arabic glottal-stop–initial words are realized in several dialects with an initial glide, as in: *wayn* 'where' < **ʔayn*, Cairene *widn* 'ear' < **ʔuḏun* 'ear' and *wākil* 'eating m.s.' < **ʔākil*, San'ani *yājūr* 'baked brick' < **ʔājurr* and Omani *yāl* < **ʔāl* (cf. Fischer and Jastrow 1980: 39).

In many dialects, weakening of the glottal stop has extended beyond word-medial and word-final positions such that stems which were historically glottal-stop initial are now vowel-initial in all but utterance-initial position. In several dialects in which *q is realized today as a glottal stop, however, in a number of original glottal-stop–initial content words the glottal stop has been maintained; and in careful speech vowel-initial words are realized with an initial glottal stop not only in utterance-initial position, but also following the definite article and other-

[4] Though not in Najdi, where the sequence *aʔa* is generally replaced by a long vowel, or the glottal stop by a voiced pharyngeal (Ingham 1994: 13–14).

wise in phonological-word–initial position. Examples from Cairene include: *gēt ʔimta* 'when did you m.s. come?', *ᶜamalt*[*i*] *ʔēh* 'what did you m.s. do?', *il-ʔabb* 'the father' and *il-ʔumm* 'the mother'. In these cases, the glottal stop is analysed as prosthetic, and is distinguished from the lexical glottal stop which is derived from **q*, and which has been maintained in the reflexes of a few original glottal-stop–initial content words.

In Jewish North African dialects, **h* has totally disappeared. In several other dialects, the glottal fricative is maintained in content words, but the initial and final **h* of pronoun suffixes has disappeared (Hamid 1984 for Sudanese; Nasr 1959*b*: 91 for a dialect of Lebanese; Fischer and Jastrow 1980: 53): while in many Peninsula dialects, including San'ani, the feminine singular nominal ending is realized with final -*h* (/ah/ or /ih/), in the majority of dialects spoken outside the Peninsula the feminine ending is realized as a short vowel /a/ or /i/.

2.1.12 *Glides*

The labio-velar and palatal glides **w* and **j* have been maintained in all dialects. In some dialects, however—including Muslim Tunisian dialects, Damascene, and Central Sudanese (Hamid 1984)—they are pronounced as [u] and [i] between consonants, respectively, before consonants in word-initial position, and after consonants in word-final position (Fischer and Jastrow 1980: 53).

2.2 THE CONSONANTAL SYSTEM OF SAN'ANI

San'ani has maintained all but two of the Classical Arabic places of articulation. The uvular place is no longer present in San'ani (the Classical Arabic voiceless uvular stop is realized as a voiced velar stop) and the original uvular fricatives are velar or post-velar. The palatal place is marginally present in the dialect: the ori-

TABLE 2.2 Consonantal phoneme inventory for San'ani

	Labial	Labio-dental	Inter-dental	Dental-alveolar	Palatal-(o-alveolar)	Velar	Pharyn-geal	Laryn-geal
Plosive	b			t, d		k, g		ʔ
emphatic				ṭ				
Affricate					ʤ			
Fricative		f	ṯ, ḏ	s, z	š	x, ġ	ḥ, ᶜ	h
emphatic			ḏ̣	ṣ				
Nasal	m			n				
Lateral				l				
Tap				r				
Glide					j	w		

ginal palatal stop has been replaced by a palatoalveolar affricate. By virtue of the merger of the emphatic voiced coronals *ḍ and *ḏ̣ to /ḏ̣/, a voiced pharyngealized interdental fricative, San'ani has lost one of the consonantal phonemes of Classical Arabic. The consonantal system of San'ani therefore comprises twenty-seven core phonemes arranged in eight places of articulation—see Table 2.2.

San'ani has one marginal phoneme, namely, /ḷ/, a pharyngealized lateral (emphatic counterpart of /l/). It is found only in the word *aḷḷāh* 'God' and derivatives. The original voiceless uvular stop, **q*, is not realized in any lexemes in the dialect. Even religious and Standard Arabic words are pronounced with a voiced velar stop, /g/, as in: *al-gurʔān* 'the Qur'an'.

2.3 THE CONSONANTAL SYSTEM OF CAIRENE

In contrast to San'ani, Cairene has lost the interdental fricatives; hence Cairene has one core place of articulation and two core phonemes less than San'ani. Like San'ani, Cairene marginalized the palatal place of early Classical Arabic. Historically, the voiced palatal stop moved back on the palate to be realized as a voiced velar stop, while the palatal fricative moved forward. There is no core uvular place in Cairene: reflexes of the uvular fricatives are realized as velar or post-velar fricatives, and, with the exception of religious and Standard Arabic lexemes, the reflex of **q* is a glottal stop. The emphatics, *ḍ and *ḏ̣, merged to be realized as a voiced pharyngealized dental–alveolar stop /ḍ/. The consonantal system of Cairene comprises twenty-five core phonemes arranged at seven places of articulation—see Table 2.3.

Cairene has eight marginal phonemes. The phonemic status of most of these is often dubious at best, since they tend to be restricted to loan words and minimal pairs are difficult to find. The marginal phonemes /p/ and /v/ are also restricted to the speech of educated speakers. The most common and most phonemic-like of the marginal phonemes is the pharyngealized dental–alveolar tap /ṛ/. Marginal

TABLE 2.3 Consonantal phoneme inventory for Cairene

	Labial	Labio-dental	Dental-alveolar	Palatal (o-alveolar)	Velar	Pharyngeal	Laryngeal
Plosive	b		t, d		k, g		ʔ
emphatic			ṭ, ḍ				
Fricative		f	s, z	š	x, ġ	ḥ, ᶜ	h
emphatic			ṣ, ẓ				
Nasal	m		n				
Lateral			l				
Tap			r				
Glide				j	w		

phonemes attested in the dialect or among certain speakers of the dialect include:

/q/ voiceless uvular stop. Restricted to religious and Standard Arabic lexemes, e.g. *il-qurʔān* 'the Qur'an', *il-qāhira* 'Cairo';

/ṛ/ pharyngealized dental–alveolar tap (emphatic counterpart of /r/). Found predominantly in European loans and in native words with guttural vowels, e.g. *baṛašutt* 'parachute', *baʔaṛi* 'my cows'. Several minimal pairs are attested including: *barr* 'to look after o.s.' versus *baṛṛ* 'to be faithful (to a promise)';

/ḅ/ pharyngealized bilabial stop (emphatic counterpart of /b/). A few minimal pairs are attested, including *ḅāḅa* 'pope, pontiff, patriarch' versus *bāba* 'second month of Coptic year (mid-October to mid-November)';

/ṃ/ pharyngealized bilabial nasal stop (emphatic counterpart of /m/). Harrell provides a small number of near-minimal contrasts and one true minimal contrast with /m/: *ṃayyiti* 'my water' versus *mayyiti* 'my dead (one)' (Harrell 1957: 75);

/ḷ/ pharyngealized lateral (emphatic counterpart of /l/). Found almost exclusively in the word *aḷḷā* 'God' and derivatives (cf. Section 2.1.7);

/p/ voiceless bilabial stop. Found in a few loan words among educated speakers, e.g. *parīs* 'Paris';

/ž/ voiced palatoalveolar fricative. Found in a few loan words, e.g. *žakitta* 'jacket', *bižāma* 'pair of pyjamas';

/v/ voiced labio-dental fricative. Found in a few loan words among educated speakers, e.g. *villa* 'villa'.

2.4 VOWELS

The major lexical contrasts in Arabic are indicated through the consonants. This is reflected in the Arabic script which is based on (mainly triconsonantal) roots of consonants and glides, and which inserts short vowels when necessary as diacritics above and below the consonant. Thus, Arabic has a very rich consonantal system and a relatively impoverished vocalic system.

2.4.1 *Short vowels*

Classical Arabic had three short vowel phonemes; two close vowels, palatal **i* and labio-velar **u*, and one open vowel, guttural **a*.

Closed	i	u
Open	a	

In certain dialects of Arabic today, **i* and **u* have collapsed to schwa to exhibit no, or only rare, distinction. These include the majority of North Mesopotamian dialects, many bedouin dialects of the Maghrib, and Mauritanian (Fischer and Jastrow

1980: 54; Singer 1980: 250).[5] This merger leaves these dialects with an effective two-short-vowel system: open /a/ versus semi-closed /ə/. For a number of other dialects, an opposition between /i/ and /u/ exists in certain contexts, but has been reduced greatly. These include a few Syrian dialects including Aleppo, Tripolis, and Hawran (Grotzfeld 1965: 12–13; Versteegh 1997: 99, 146), and, to a lesser extent, certain dialects of Sudanese (J. Dickins p.c.) and Cairene. San'ani, in common with most dialects of Yemeni Arabic, preserves the opposition between the two close vowels in most contexts.

2.4.2 *Long vowels*

In contrast to short vowels, the opposition between /i/ and /u/ exists in all dialects in the long vowels. All modern dialects of Arabic have at least three long vowels, /ā/, /ī/, and /ū/. /ī/ and /ū/ have an articulation which is closer than that of their short counterparts, and /ā/ has a front articulation.

Closed	ī	ū
Open	ā	

2.4.3 *Diphthongs*

The dialects also have diphthongs or monophthongs derived historically from diphthongs. The diphthongs are **ay* and **aw*, which coalesced historically in dialects such as Cairene, Central Sudanese (Hamid 1984: 27–8), and those spoken in much of the Levant, to be realized as /ē/ and /ō/. In San'ani and a number of Peninsula dialects, the diphthongs are maintained in all phonological contexts.

	Palatal	Labio-velar
San'ani	ay	aw
Cairene	ē	ō

Among some Cairene speakers, the monophthongs are shortened in closed syllables to give short *e* and *o*, as in *gozha* 'her husband' (cf. *gōz* 'husband'), and *ma ᶜalehš* 'never mind' (cf. *ᶜalēh* 'on him').[6] These latter are derived from long monophthongs resulting from historical diphthongs, hence the short mid vowels are not considered to be separate phonemes.

[5] In non-bedouin dialects of the Maghrib, including Casablanca, Tangiers, and the Jewish dialect of Tunis, **a* and **i* have collapsed to schwa to give an opposition between rounded /u/ and unrounded /ə/ (Singer 1980: 249; Heath 1987: 27–8). According to Singer (1980), all short vowels have collapsed to schwa in some non-bedouin Maghrib dialects.

[6] Among the majority of speakers of Cairene, short mid vowels are not attested (see Section 3.4.11).

2.4.4 *Cairene long vowels*

The issue of long mid vowels in Cairene is more complicated. There is some evidence that coalescence in Cairene is a historical process which no longer applies: Badawi and Hinds (1986) record a large number of words attested in Cairene with diphthongs intact, such as *šayṭan* 'to behave naughtily', *dawla* 'state', *dawša* 'loud noise, din'. In addition, diphthongs derived through shortening of an unstressed long vowel are not subject to monophthongization. These include words such as *^{c}awza* '[modal of desire f.s.]' (< /*^{c}āwiz* + *a*/), *šayla* 'carrying f.s.' (< /*šāyil* + *a*/) and *mudawla* 'consultation' (< /*mu* + *dāwal* + *a*/). Broselow suggests that the massive influx of forms with diphthongs shows that at an earlier stage in the history of Cairene, forms which had undergone coalescence were reanalysed as having underlying long vowels and the rule of coalescence dropped out; as a result, newer forms with diphthongs were preserved intact (Broselow 1976: 152–3). This has lead to a situation today in which mid-vowel monophthongs contrast with derived diphthongs. The existence of minimal pairs involving diphthongs and long monophthongs, as in *^{c}awza* 'wanting f.s.'–*^{c}ōza* 'want, need' and *šayla* 'carrying f.s.'–*šēla* 'burden', and among some speakers minimal pairs involving the short high vowels and shortened monophthongs, as in: *gibna* 'cheese'–*gebna* 'our pocket' and *ʔumna* 'we stood up'–*ʔomna* 'our tribe', necessitates the positing of a five-member long vowel system for this dialect:

Closed	ī		ū
Mid	ē		ō
Open		ā	

The historical development of Cairene has resulted in a system with a larger number of long vowels than short vowels. Interestingly, Maddieson's study of the phoneme inventories of the 317 languages of the UPSID database shows that the higher mid long vowels /ē/ and /ō/ are far more likely to appear in a language without corresponding short vowels of the same quality than any of the other vowels examined: 18 per cent of languages with /e(:)/ have only /ē/ and 19.6 per cent of languages with /o(:)/ have only /ō/. This contrasts with 6.6 per cent of languages with /ī/ but no /i/, 4.9 per cent of languages with /ū/ but no /u/, and 2.9 per cent of languages with /ā/ but no /a/ (Maddieson 1984: 130).

3

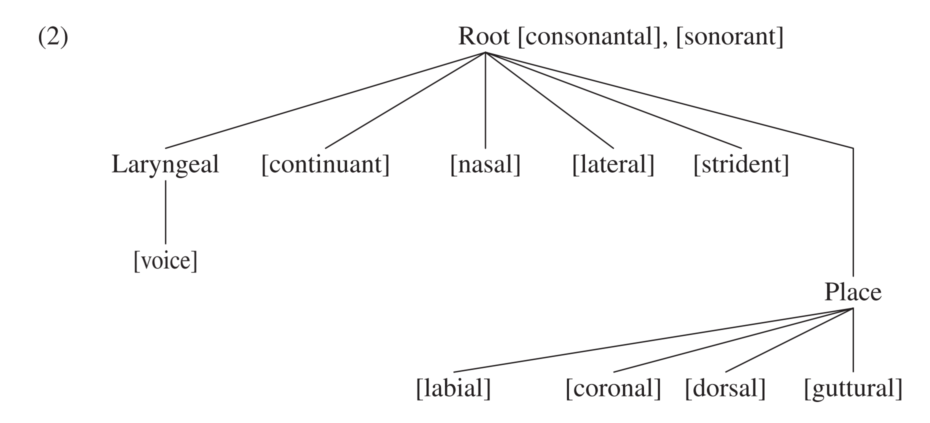
PHONOLOGICAL FEATURES

It has been long understood that speech sounds are not atomic, indivisible units, but that they are made up of a number of phonological features. In earlier work, speech sounds were represented as unordered sets or bundles of distinctive features (Bloomfield 1933: 79; Chomsky and Halle 1968: 335 ff., Lass 1984: 94). Today it is understood that speech sounds are internally structured: certain groups of phonological features behave as units in assimilation processes; certain features appear to be dependent on other features—[distributed] and [anterior], for example, are relevant for coronals and not for velars or labials; in assimilation processes certain spreading features appear to be contingent on the presence of features shared between the trigger and target (Cole 1987). The need to provide a structured representation of phonological features was first properly addressed in Clements's (1985) paper entitled 'The geometry of phonological features' in which he proposed that features are arranged geometrically. Feature geometry represents both the separate and the coordinated aspects of features within a hierarchical structure. In the model of feature geometry that I adopt, phonological features and feature values fulfil the four basic criteria listed in (1).

(1)
1. Phonological features are articulatorily appropriate.
2. Phonological features and the relationships between phonological features are sufficient to distinguish all the phonemes in the language.
3. Phonological features are sufficient and necessary to account for phonological processes in the language.
4. The inventory of phonological features in a language is minimally redundant.

In this work, I assume the feature geometry tree for Arabic given in (2). Root and root-dependent features combine independently substantiated proposals by Clements (1985), Sagey (1986), McCarthy (1988), Shaw (1991), and Halle (1992, 1995). The organization of features attached to the place node is due to Selkirk (1988, 1993). Nodes which are not placed in square brackets are purely structural organizational nodes. Nodes which have no dependents are described as terminal nodes, and terminal nodes must have phonetic content. Organizational nodes such as the place and laryngeal nodes cannot occur terminally because they lack any phonetic content (Archangeli and Pulleyblank 1994: 21). Nodes which dominate other nodes lower down the tree are described as mother nodes, while the dominated nodes are described as daughter nodes.

(2)



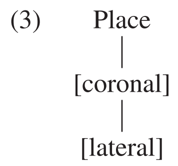
Features are grouped into root features ([consonantal],[1] [sonorant]), stricture features ([continuant], [nasal], [lateral]) and the acoustic feature ([strident][2]), the laryngeal feature ([voice]), and place/articulator features ([labial], [coronal], [dorsal], [guttural]). In this model, I follow McCarthy in assuming that the supralaryngeal organizational node plays no role in the feature geometry (McCarthy 1988). I also follow McCarthy (1988), Shaw (1991), Halle (1992, 1995) and others in assuming that the nodes [consonantal] ([cons]) and [sonorant] ([son]) form the root of the feature tree. There are two principal reasons for this organization. First, [cons] and [son] rarely spread outside of complete assimilation, and placing the features in the root of the tree explains this point. Secondly, every language distinguishes consonants from vowels and sonorants from obstruents, but although most languages distinguish between at least one stop and fricative or nasal this is by no means universal—some Australian languages have no fricatives and some Salish languages lack nasals. Locating [cons] and [son] at the root of the tree expresses the intuition that higher-level features are more basic categories of contrast (Kenstowicz 1994: 453). Within the present model, all features are monovalent (cf. Anderson and Ewen 1987; van der Hulst 1989; Watson 1989; Rice 1990, 1994: 114; Rice and Avery 1991: 104; Grijzenhout 1995: 166). The interaction of underspecification and universal and language-specific redundancy rules renders it unnecessary for any feature to be bivalent.

The grouping of [lateral] with the stricture features requires some comment. A small number of phonologists have argued that the feature [lateral] is a dependent of the [coronal] node on the basis that lateral sounds are virtually always [coronal] (for instance, Levin 1988; McCarthy 1988: 103; Pulleyblank 1988: 311; Blevins

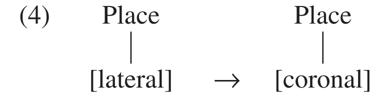
[1] Hume and Odden (1995, 1996) consider [consonantal] to be superfluous, arguing that [consonantal] never functions as the sole feature responsible for distinguishing segments. In this work, however, I maintain the feature [consonantal].

[2] In contrast to Halle (1992) and others, Grijzenhout (1995) and Hall (1997) represent [strident] as a dependent of [coronal].

1994; Grijzenhout 1995). However in view of the generally agreed position that [coronal] is universally the default articulator (cf. Avery and Rice 1989; Rice and Avery 1991; Shaw 1991; Grijzenhout 1995),[3] there is a strong counterargument that the specification of [lateral] as a dependent of [coronal] is unnecessary and undesirable. In an underspecified representation, if [lateral] were the daughter of the [coronal] node then not only [lateral], but also the mother node [coronal] would have to be specified in the underlying representation (Paradis and Prunet 1991: 15), as in (3).



If [lateral] is a stricture feature attached directly to the root node, however, the following (universal) redundancy rule ensures that [lateral] segments have a [coronal] articulator:



The presence of velar laterals in certain languages of New Guinea also shows that laterals are not universally coronal (Maddieson 1984: 77; Ladefoged and Maddieson 1996: 190). I therefore assume that [lateral], in common with [strident], [continuant], and [nasal], is not bound to any one particular articulator.

3.1 ROOT FEATURES

The root features are [cons] and [son]. [Cons] denotes segments produced with 'a constriction in the central passage through the oral cavity' (Halle 1992, cited in Kenstowicz 1994: 453). On the basis of this definition, [cons] implies constriction made with a primary [labial], [coronal], or [dorsal] articulator. Gutturals, which are produced in the laryngeo-pharyngeal zone, involve no oral constriction and are not [cons]. Obstruents and sonorant stops (nasals and liquids) are [cons]. Vowels, glides and approximants lack the feature [cons]. [Son] segments are produced with a vocal tract configuration sufficiently open that the air pressure inside and outside the mouth is approximately equal (Halle and Clements 1983: 6). Vowels, glides, nasals and liquids are [son]. The features [cons] and [son] distinguish the major sound classes, as in (5).

[3] However, on the basis of phonotactic restrictions, Grijzenhout (1998) argues that coronal specification plays a crucial role in German and Dutch and that velars lack a C-place feature.

(5)

	Obstruent	Sonorant	Vocoid
[cons]	+	+	
[son]		+	+

3.2 STRICTURE FEATURES

The 'manner' or stricture features are attached to the root (but not located in the root).[4] Segments involving [lateral] are produced by lateral release of air; segments involving [nasal] are produced with an open nasal cavity and hence nasal release of air; and segments involving [continuant] ([cont]) are marked by an uninterrupted airflow through the midsagittal region of the oral tract. The stricture features are supplemented by the acoustic/auditory feature [strident]; [strident] is used to describe the high-pitch intensity associated with sibilants. Articulatorily, [strident] sounds involve midsagittal grooving of the tongue to channel the airflow downstream onto an obstacle, typically the teeth (Laver 1994: 261). The stricture features distinguish the types of consonantal sonorants and obstruents—see (6).

(6)

	Lateral	Nasal	Fricative	Sibilant	Plosive
[lateral]	+				
[nasal]		+			
[cont]			+	+	
[strident]				+	

3.3 LARYNGEAL FEATURES

The only laryngeal feature relevant for Arabic is [voice]. [Voice] describes the vibration of the vocal cords. Segments which lack the feature [voice] are produced with open vocal cords. Aspiration is not a feature of Arabic consonants on the whole: aspirated consonants are distinguished from non-aspirates by the feature [cont]. Thus, the pure laryngeal aspirate /h/ is distinguished from the pure laryngeal non-aspirate by the presence of [cont] for the former and not for the latter.

(7)

	h	*ʔ*
[cont]	+	
[voice]		

[4] In models which incorporate a supralaryngeal organizer node, the 'manner' or stricture features are attached to the supralaryngeal node (e.g., Booij 1995: 10).

3.4 PLACE/ARTICULATOR FEATURES

For the representation of features attached to the place node, I assume an abstract reductionist model based on Selkirk's 1993 [Labial]-Only Theory. In [Labial]-Only Theory, Selkirk proposes that [labial] is the only feature in the universal repertoire of phonological features available for the representation of labiality, whether it takes the form of bilabial compression, labiodental retraction, or lip rounding. Any theory of phonological features which lacks a distinct representation for labiodentals, for instance, hands over to the phonetics the task of specifying whether a labial consonant is realized with bilabial compression (*b*, *m*, *p*) or with retraction of the lower lip (*f*, *v*). In the same way, any theory which lacks the feature [round] is committed to saying that all realizations of [labial] as rounding are predictable (Selkirk 1993: 2). In her 1993 manuscript, Selkirk demonstrates that since the details of the shape and location of [labial] articulations are always predictable as a matter of default specification, what might be called [Labial]-Only Theory can be maintained. This is summed up in (8) (Selkirk 1993: 2).

(8) *The [Labial]-Only Theory of the Place Feature Repertoire*
The place feature repertoire of phonological theory includes only the feature [labial] for the representation of labial articulation.

[Labial]-Only Theory contrasts with [labial]-plus theories which maintain that the features [round] and [labiodental] may play a role in the phonology. In [Labial]-Only Theory, the feature repertoire is reduced to four places of articulation termed COVER FEATURES. These four cover features are {labial, coronal, dorsal, guttural}. Broadly, [labial] describes segments produced by constriction of the labia; [coronal] describes segments produced by the tongue tip and blade; and [dorsal] describes segments produced by the tongue body. In contrast to the other features attached to the place node, [guttural] denotes a zone of articulation, rather than an articulator, and distinguishes segments produced in the laryngeo-pharyngeal region (see Section 3.4.5). Therefore in what follows I describe {labial, coronal, dorsal} as articulators, and [guttural] as a place. When referring to the features attached to the place node as a group, I shall use the term PLACE FEATURES. In the present model, [guttural] takes the place of Selkirk's (from McCarthy's) [pharyngeal], and in contrast to McCarthy (1991) and Halle (1992), [guttural] is a sister of all other place features, not a daughter of a separate pharyngeal class node. The feature repertoire has no phonetically grounded PRIME FEATURES which realize the cover feature. Selkirk argues that phonological features can be reduced to a minimum by allowing the phonetic interpretation of place features to account for the realization of a particular feature in a particular context, and thus phonetically grounded prime features are introduced by default rules in the phonetic interpretation. The Phonetic Interpretation of Place Features has three parts and is given in (9) (Selkirk 1993: 3).

(9) *The Phonetic Interpretation of Place Features*

(a) The Phonetic Interpretation of Primary Place (PIPP)
The phonetic realization of a primary place feature is necessarily contingent on the stricture features of the segment containing it. It may also be contingent on non-primary place features of the segment.

(b) The Phonetic Interpretation of Non-primary Place (PINP)
The phonetic realization of a non-primary place feature may be independent of the other features of the segment containing it, or it may be contingent on the other place and/or stricture features of the segment.

(c) Rank–Stricture Correspondence (RSC)
The degree of constriction in the articulation realizing a non-primary place feature in a segment does not exceed the degree of constriction of the articulation of a primary place feature in the same segment.

Crucially, the stricture of a segment is responsible for the phonetic interpretation of the place feature in a particular context. From the investigation of labials in a large number of languages, Selkirk observes that the following generalization holds (Selkirk 1993: 54):

(10) *The phonetic interpretation of primary [labial]*

1. A primary [labial] stop is bilabial.
2. A primary [labial] fricative is labiodental.
3. A primary [labial] vocoid is round.

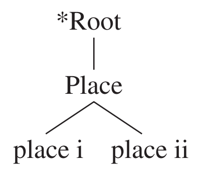
This does not mean to say that no language could have bilabial fricatives or labiodental stops or that primary [labial] in vocoids could not be realized as other than round; however, (10) should be understood as a strong generalization based on the investigation of a large number of languages, and certainly as what will hold in case the phonology of a particular language fails to specify that a segment is [round] or [labiodental], etc. This articulator-only approach holds not only for the [labial] articulator but also for the articulators [coronal] and [dorsal], and for the place feature [guttural]. In this chapter, I discuss primary versus non-primary place and then consider the representation of Cairene and San'ani consonantal and vocalic phonemes within an articulator-only approach. Within the discussion, I consider the [coronal]–front vowel debate and argue that a [coronal] representation of front (or palatal) vocoids is inappropriate since it fails to meet the criteria mentioned at the beginning of this chapter. I demonstrate that maximization of the cover feature [dorsal] in an articulator-only approach can provide a far more articulatorily and phonologically appropriate representation of the palatal vocoids.

3.4.1 *Primary versus non-primary place*

Segments which are multiply articulated are characterized as having more than one feature from the set {labial, coronal, dorsal, guttural}. Phonetically the mul-

tiple articulations of these segments may be either of equal constriction, as in *w* and doubly-stopped *kp*, or of unequal constriction, as in labialized k^w and palatalized t^j. Where one constriction is more radical than the other the more radical constriction is traditionally held to be the primary articulation, with the less radical constriction described as the secondary articulation.[5] A crucial aspect of the theory adopted here is the assumption that in phonological terms the primary/non-primary distinction is *necessarily* at play in all multiply-articulated segments (as first proposed by Anderson 1976), even where the multiple articulations in a particular segment are (or appear to be) identical in constriction (Selkirk 1993: 6).[6] Thus, a labial-velar consonant /kp/ or /gb/ in a language patterns phonologically either with velar consonants, or with labial consonants, but not with both, and the phonological identification of /kp/ as a labialized velar or as a velarized labial derives from the overall, language-specific system of segmental oppositions, and not from the phonetics of the consonant (Anderson 1976: 22). In the consonant systems of Anum and Efik, the voiced labial /b/ is present, the voiceless member /p/ is absent, and there is also an unpaired labial-velar /kp/. These two languages also have a plain and a labialized velar, /k/ and /k^w/, which are distinct. Since the labial-velar /kp/ contrasts with /k^w/, /kp/ cannot also be a velar with secondary labialization, and thus /kp/ appears as a labial with secondary velarization (Anderson 1976: 23). Similarly, the labial-coronal stop /tp/ is phonologically a primary [coronal] in Abkhaz, but an allophone of a primary [labial] phoneme in Nzema (Berry 1955; Anderson 1971, both cited in Selkirk 1993: 74). The observation that multiply-articulated segments necessarily involve a primary/non-primary place distinction even where the two articulations are identical in the degree of constriction leads to the constraint in (11), ruling out representations with dual primary place (Selkirk 1993: 32):

(11) *No dual primary place*

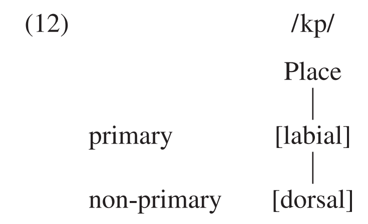


In Selkirk's model, as here, the primary feature is represented as immediately dominated by the place node, while the non-primary feature is immediately dominated by the primary feature. Accordingly, the representation of place features of the labial-velar /kp/ in Anum and Efik is as in (12).

[5] Following Selkirk, I use the term *non-primary* rather than secondary to describe the less radical constriction (Selkirk 1993: 5).

[6] This contrasts with the dual-primary status of *kp* assumed by Ladefoged and Maddieson (1988), Smith (1988) and Clements (1991), (Selkirk 1993: 5).

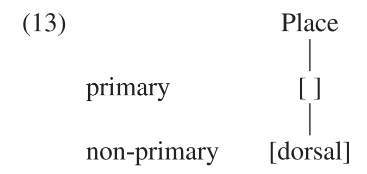
(12)



Arabic has no labial-velar stops, but it does have the doubly articulated labio-velar glide /w/ and vowel /u/. The labio-velar vocoids pattern with the palatal vocoids in the language; hence they are analysed as primary [dorsal] and non-primary [labial], and therefore have the opposite arrangement of place features as Anum/Efik /kp/ in (12).

The model adopted here draws a distinction between place features and nodes. However, in contrast to some other feature geometry models, place features may not spread independently of the nodes with which they are associated. The features can be thought of as labelling the nodes, but not as being independent of the nodes. This feature–node theory makes available the possibility of representing non-terminal empty nodes, that is, nodes with no labelling by a particular place feature (Selkirk 1993: 27), as in (13).

(13)



The empty node has the status of a place holder and makes it possible to represent the deletion of a primary feature without the necessary deletion of the non-primary feature or its promotion to primary status. The possibility of empty non-terminal place nodes will be shown to be crucial in the representation of interdentals in San'ani.

3.4.2 *[Labial]*

[Labial] describes constriction by the lips and, particularly as a non-primary feature, involves expansion of the vocal tract at the lips. Under an articulator-only approach, the [labial] phonemes of Cairene and San'ani are distinguished by the interaction of the root features [cons] and [son], the laryngeal feature [voice], and the stricture features [cont] and [nasal]. Three of the phonemes in (14), /b, m, f/, are marked by primary [labial] while the vocoid /w, u/ is marked by non-primary [labial] as a daughter to primary [dorsal].

(14)

	b	*m*	*f*	*w/u*
[cons]	+	+	+	
[son]		+		+
[cont]			+	+
[nasal]		+		
[voice]	+	+		+

It has long been recognized that not all phonological properties of a segment need to be represented underlyingly, since certain features are predictable from the presence of other features (cf. Booij 1995: 12). For example, sonorants are assigned the feature [voice] redundantly, because [voice] is predictable from the presence of [son]. Similarly, [son] is predictable from the presence of [nasal]. The matrix in (14) has a number of predictable features. Removal of these redundant features gives the matrix in (15).

(15)

	b	*m*	*f*	*w/u*
[cons]	+		+	
[son]				+
[cont]			+	+
[nasal]		+		
[voice]	+			

Universal and language-specific redundancy rules fill in the predictable values—see (16).

(16) *Universal redundancy rules*

[nasal] → [sonorant]
[sonorant] → [voice]

Since the Arabic dialects under discussion do not have underlying nasal vowels, the following language-specific redundancy rule in (17) also holds.

(17) [nasal] → [consonantal]

3.4.3 *The [coronal]–front vowel debate*

In recent years, there has been considerable debate over the representation of front vowels on the basis of phonological relationships between front vowels and palatalized consonants. In Hume (1992) and Clements and Hume (1995), the feature [coronal] links true coronals, palatal consonants, and palatal vocoids. As I show in earlier work (Watson 1999*b*; Watson and Dickins 1999), there are a number of problems with this approach. First, in terms of their articulation, palatal vocoids bear considerably more resemblance to other [dorsal] sounds than to [coronal] sounds, and thus a [coronal] representation of palatal vocoids fails to fulfil the criterion of articulatory appropriateness in (1) above. Secondly, while [coronal] is the unmarked feature in consonants and is underspecified across a wide range of languages, palatal consonants are extremely rare. And thirdly, as I show below,

a [coronal] representation of palatal vocoids fails to account for the relationship between the *target* of palatalization processes and the trigger.

One of the main motivations for use of [coronal] in the representation of palatal vocoids is [coronal]–front vowel relationships found in various forms in a number of languages, including Acadian French, Maltese, and Slovak. Broadbent (1997) reanalyses the consonant–vowel interactions in Maltese and shows that the connection between coronal consonants and front vowels in the imperfect verb in this language can be attributed far more simply to coronal underspecification. In this chapter, I shall discuss the data from Acadian French and Slovak since it is similar to palatalization processes which occur at least historically in Arabic (Watson 1992). I argue that an account of the phonological processes involved can be provided, not on the basis of a shared feature [coronal], but rather on the basis of Universal Markedness Conventions.

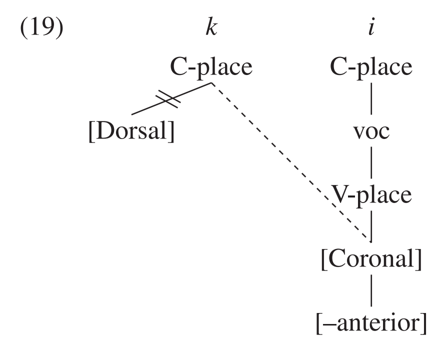
In Acadian French, optional rules of palatalization and coronalization shift the velar consonants /k, g/ to palatalized velars [k^j, g^j] or palatoalveolar affricates [tš, ʤ] before front vowels, as in (18).

(18)	/kø/	kø~k^jø~tšø	'tail'
	/gɛte/	g^jɛte~g^jɛte~ʤɛte	'to watch for'

This is interpreted as spreading of the coronal feature of the front vowel onto the velar consonant (Hume 1992; Clements and Hume 1995: 294–5). Coronal links under the vocalic place node of the consonant with interpolation of a new vocalic place node to retain well-formedness. To move from k^j to *tš*, Clements and Hume claim that the minor coronal articulation may be optionally reassigned major articulatory status by a process known as *promotion* whereby the minor articulation of the consonant is delinked and copied under the consonantal-place node, where it replaces the original major dorsal articulation (Clements and Hume 1995: 295).

Slovak has no intermediate palatalization phase: the velars /k, g, x, ġ/ are realized as [tš, ʤ, š, ʒ] respectively when followed by a front vocoid. Coronalization is interpreted by Hume (1992) as the [coronal] feature of the front vowel spreading directly to the C-place node of the velar and replacing the original [dorsal] feature.

(19)



While the Clements and Hume model goes some way towards explaining the relationship between the trigger and the output in palatalization processes, it singularly fails to explain the relationship between either the trigger and the velar target or the velar target and the outcome. As Goad and Narasimhan (1994) point out, there is nothing in the Hume (1992) approach (carried forward in Clements and Hume 1995) to preclude palatalization of labials before front vowels, and while velar fronting is a common process, labial palatalization (resulting in [tš]) is very rare.

In Watson (1999*b*) and Watson and Dickins (1999), it is argued that both of these phonological processes can be explained as instances of catastrophic shift on the basis of Universal Markedness Conventions. Palatalization processes are very common in the world's languages. However, palatal consonants are not, and both palatal stops and fricatives are highly marked. Less than 5 per cent of languages include the palatal fricative /ç/ in their phoneme inventory, and the voiced palatal fricative /ʝ/ is even more rare (Maddieson 1984; Ladefoged and Maddieson 1996: 165). This is almost certainly due to the physiological difficulty of producing palatal stops and fricatives, on the one hand, and their lack of auditory distinctness, on the other. Where palatal stops do occur in a language, as in a number of northern Yemeni dialects of Arabic (Watson 1989; Behnstedt 1985: 42; Jastrow 1980: 105) and Sudanese (Kaye 1976: 7; Reichmuth 1983: 12), they often have coronal and velar allophones in some cases in free variation (Kaye 1976: 84–5). Similarly, the palatal fricative /ç/ in German is realized as [x] in the environment of back vowels and, in some dialects of German, has been reinterpreted as the considerably less marked palatoalveolar fricative /š/ (S. J. Hannahs, p.c.). Where palatal consonants are involved, either as part of the phoneme inventory of the language or as a result of palatalization processes, catastrophic shifts are likely to occur in the direction of articulations which are both more auditorily and acoustically distinctive and easier to produce. While the equation of palatal vowels with [coronal] has a certain appeal in explaining the relationship between the trigger and the outcome in the cases of palatalization and coronalization mentioned above, this use of [coronal] actually serves to obscure the issue—namely, that palatal for consonants is a highly-marked place of articulation and is, where possible, avoided.

Furthermore, as Elmedlaoui points out (1995: 204–8), any account of palatals and palatalization which involves the feature [coronal] (as in Keating 1988; Clements 1991; Hume 1992; Clements and Hume 1995) fails to provide an account of de-coronalization processes found in languages such as Rifian Berber (Elmedlaoui 1995: 196–7). In the speech of the older generation, the vocoids /i, j/ devoice to [ɕ] to the left of a voiceless consonant, as in (20).

(20) amrwøj (masc.) θamrwøɕθ (fem.) 'cow [pejorative]'

To the left of a coronal strident, however, the coronalized palatal *ɕ* derived from the devoicing of /i, j/ is decoronalized and realized as a pure palatal fricative [ç] (Elmedlaoui 1995: 196, 197, 207):

(21) yøs (sg.) içsan (pl.) 'horse'

If palatalization and coronalization were both represented by non-primary [coronal], there would be no way of adequately capturing the fact that decoronalized ɕ is realized as palatal [ç]. In this sense, [coronal] as a representation of palatal vocoids fails to meet the third criterion for phonological features and feature values mentioned in (1), and repeated here for convenience:

(22) Phonological features are necessary and sufficient to account for phonological processes in the language.

3.4.4 *[Dorsal]*

[Dorsal] describes constriction by the tongue body and, particularly as a non-primary feature, involves pharyngeal expansion. In recent work (Watson 1999*b*; Watson and Dickins 1999), I propose that the debate over the representation of palatal vowels can be resolved by maximizing the cover feature [dorsal] in an articulator-only approach and by allowing phonetic interpretation in conjunction with Universal Markedness Conventions to realize segments containing [dorsal] in a particular context with a particular stricture. Thus, a primary [dorsal] stop is predicted to be velar (/g/, /k/), since virtually every language has velar stops (Ladefoged and Maddieson 1996: 33). A primary [dorsal] fricative is predicted to be post-velar (/x/, /ġ/), but not uvular: [dorsal] uvular fricatives (/χ/, /ʁ/) are distinguished from [dorsal] velar fricatives by the additional specification of non-primary [guttural]. Finally, [dorsal] vocoids are predicted to be palatal (/i/, /j/): Maddieson (1984: 94) shows that while the majority of languages in the UPSID database have /i/ and /u/, there are more cases where /u/ is missing than /i/. There are also three times as many cases of /w/ occurring without /u/ than of /j/ occurring without /i/ (Maddieson 1984: 92). Since /i/ is frequently involved in parasitic harmony processes with /u/ as the target but never the trigger of harmony (Cole 1987; Cole and Trigo 1988; Watson 1989, 1993*a*, 1995*a*), /i/ should bear no feature lacked by /u/, while the non-primary feature [labial] distinguishes /u/ from /i/ (and /w/ from /j/). The common feature shared by /i/ and /u/ is [dorsal]. The phonetic interpretation of primary [dorsal] is summed up in (23).

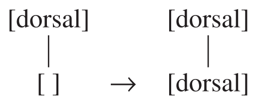
(23) *The phonetic interpretation of primary [dorsal]*

1. A primary [dorsal] stop is velar.
2. A primary [dorsal] fricative is post-velar.
3. A primary [dorsal] vocoid is palatal.

This interpretation does not imply that no language will have palatal stops or fricatives, but it does say that palatal stops and fricatives are highly marked. Accepting the arguments in Broadbent (1994, 1996, 1999) that front vowels are not coronal,

I claim that the only vowels represented by the feature [coronal] (primary or non-primary depending on the phonology of the language) are central vocoids, including the vowel schwa. I further propose the vocoid default rule in (24) which states that a primary [dorsal] vocoid is assigned non-primary [dorsal] in the default case (if, for example, spread of non-primary [labial] does not occur).

(24) *Vocoid default rule*



Rule (24) has the status of a markedness statement such that only in the marked case does the phonology of a language fail to assign a non-primary specification to a primary [dorsal] vocoid (allowing the vocoid to be realized as the high, back unrounded vowel, [ɯ], or approximant, [ɣ], depending on its position within the syllable).[7] I further assume that non-primary [dorsal] is assigned early in the derivation to a [dorsal] vocoid which associates directly with the syllable node or which is linked to two moras. This ensures that only [dorsal] vowels linked to a single mora are underspecified for non-primary place, and explains the propensity of monomoraic [dorsal] vowels alone to assimilate the non-primary place of adjacent vocoids.

As with [labial] sounds, [dorsal] sounds are distinguished from one another by the interaction of the root feature [son], the laryngeal feature [voice], and the stricture feature [cont]. (There are no [nasal] dorsal phonemes in either Cairene or San'ani, therefore [nasal] is not an active feature in the specification of [dorsal]s.) Consider the fully specified matrix in (25) in which the dorsal sounds of the dialects are distinguished.[8]

(25)

	g	*k*	*ġ*	*x*	*j/i*
[son]					+
[cont]			+	+	+
[voice]	+		+		+

In this matrix, [voice] is predictable from the presence of [son]. The removal of this feature for /j, i/ gives the following matrix:

(26)

	g	*k*	*ġ*	*x*	*j/i*
[son]					+
[cont]			+	+	+
[voice]	+		+		

[7] In Maddieson's survey, only five instances of /ɣ/ are found in the 317 languages of the UPSID data base (Maddieson 1984: 92).

[8] In Cairene and San'ani, the [dorsal] fricatives are phonetically post-velar but phonologically velar, and hence [dorsal]: in contrast to all other post-velar consonants in the dialects, they have no effect on adjacent vowels. In certain other modern Arabic dialects, including North Palestinian Druze (Jakobson 1957), [dorsal] fricatives are phonetically and phonologically uvular and are analysed as emphatic [dorsal]s.

Predictable values are filled in by universal redundancy rule—see (27). (There are no relevant language-specific redundancy rules for [dorsal] sounds.)

(27) *Universal redundancy rules*

[son] → [voice]

3.4.5 *[Guttural]*

In Arabic, as in Semitic generally, the laryngeals, pharyngeals, and uvular fricatives pattern together phonologically as a guttural class in a number of areas. Firstly, in Arabic, Maltese, and Ethiopian Semitic, guttural consonants lower adjacent vowels. In Maltese, the imperfect prefix vowel is realized as [a] when followed by a stem-initial guttural, but as [i] elsewhere (Brame 1972, cited in Hayward and Hayward 1989: 185), as in: *ni+kteb* 'I write' and *ni+nzel* 'I descend' versus *na+ʔbez* 'I jump' and *na+ʔleb* 'I overturn'. In Najdi Arabic, the initial vowel of the perfect verbal stem is realized as [i] unless the first or second consonant is a guttural, in which case it is realized as [a]: *ḥafar* 'he dug' contrasts with *kitab* 'he wrote' (Ingham 1994: 19); and in San'ani Arabic, the nominal {feminine singular} suffix is realized as [ih][9] unless preceded by an adjacent guttural consonant, in which case it is realized as [ah]: the suffix in *karīhah* 'hateful f.s.' contrasts with that in *garībih* 'near f.s.'. Secondly, root co-occurence restrictions in Semitic described by Greenberg (1950) show an avoidance of roots built from two distinct members of the guttural set. Thirdly, in Tiberian Hebrew (McCarthy 1994: 215–16) and in many Bedouin dialects of the Arabian Peninsula, a laryngeal or pharyngeal may not fall in coda position. An original coda guttural will induce epenthesis with stress assigned to the epenthesized vowel: **gahwah* is realized in Arabic Bedouin dialects as *gahawah* 'coffee', **aḥmar* as *ḥamar* 'red' and **yaᶜrif* as *yᶜarif* or *yᶜarf* (Blanc 1970; Jastrow 1980: 109; Ingham 1994: 19 for Najdi).[10] A similar phenomenon is witnessed in Jibbali where stress cannot fall on a vowel preceding a guttural consonant (Johnstone 1981, cited in Hayward and Hayward 1989: 182). And, fourthly, a number of Semitic languages—including Tigre and Tiberian Hebrew—prohibit guttural geminates (Moscati *et al.* 1964: 161; McCarthy 1994: 216–17). Phonetically, the gutturals pattern together insofar as they share a high F1 value and constriction in the back of the vocal tract.

Observations such as these have lead Hayward and Hayward (1989), McCarthy (1991, 1994), and others to recognize 'guttural' as a natural class in generative phonology. McCarthy (1991, 1994) proposes recognition of this class through the feature [pharyngeal], and Hayward and Hayward (1989) through the feature [guttural]. It is [guttural] which I adopt here.

[9] When a pharyngealized coronal falls in the same word, the {feminine singular} suffix is realized as [uh] (see Section 10.5).

[10] Note that from this point on, I represent the palatal glide as /y/ and the palatoalveolar affricate as /j/, in common with Arabist practice.

The feature [guttural] denotes a zone of articulation with constriction in the laryngeo-pharyngeal region, that is, in that part of the vocal tract which extends from the end of the oral cavity (i.e. the uvula) to the larynx (Hayward and Hayward 1989: 187–8; cf. McCarthy 1994: 192), rather than a single specified articulator: laryngeals are produced with a 'glottal' articulator; pharyngeals may involve any of a number of gestures, and are produced in some languages through constriction near the epiglottis (Ladefoged and Maddieson 1996: 169), and in others by means of a lateral compression of the pharynx immediately behind the oral cavity (Catford 1977: 163); and uvular fricatives are produced through retraction of the tongue-root to the posterior wall of the upper pharynx.

Thus, [guttural] describes general pharyngeal constriction and contrasts with the pharyngeal expansion characteristic of [dorsal] in its non-primary manifestation. Within the laryngeo-pharyngeal zone of articulation, the glottis, the pharynx, the tongue root or the tongue dorsum may be actively involved in constriction, depending on whether [guttural] appears in its primary or non-primary instantiation, and depending on other place and stricture features of the segment. In Arabic, the realization of [guttural] is dependent on other place and stricture features of the segment to a far greater degree than the other place features. This is particularly the case where [guttural] appears in its non-primary instantiation. The [guttural] phonemes in Arabic include the laryngeals /h/ and /ʔ/, the pharyngeals /ḥ/ and /ˁ/, the vowel /a/, and, with [guttural] as a non-primary feature, the uvulars /χ, ʁ, q/[11] and the pharyngealized coronals /ṣ, ṭ, ḍ, ẓ, ḏ̣/.[12] The pharyngeals are distinguished from the laryngeals by an additional non-primary [guttural] feature (see Section 3.4.9). The phonetic interpretation of primary [guttural] is given below:

(28) *The phonetic interpretation of primary [guttural]*

1. A primary [guttural] stop is glottal (*ʔ*).
2. A primary [guttural] fricative is laryngeal (*h*).
3. A primary [guttural] vowel is pharyngeal (*a*).

Segments which lack an oral articulator ([labial], [coronal], or [dorsal]) lack the feature [cons] (see Section 3.1). The primary [guttural]s therefore share the absence of [cons], and are distinguished from one another by the stricture feature [cont] and the root feature [son]:

(29)

	h	*ʔ*	*a*
[cont]	+		+
[son]			+

In Cairene and San'ani, as in Arabic generally, the glottal stop acts as the post-lexical default consonant: this is the consonant which is inserted in the default case to provide an onset for an otherwise vowel-initial syllable (see Sections 4.4.1.2

[11] And the [dorsal] fricatives for dialects in which [dorsal] fricatives are phonologically post-velar.
[12] Not all attested in the same dialect!

and 9.1.2.3); it is also the consonant which is most commonly subject to elision in fast, casual speech (Watson 1989, 1991). The default status of the glottal stop is reflected in the matrix in (29) through lack of stricture and root features.

3.4.6 *[Coronal]*

The feature [coronal] describes a constriction produced by the tongue tip or blade; in its non-primary instantiation, [coronal] describes centralizing in vowels. In contrast to the features [labial], [dorsal], and [guttural], [coronal] interrupts the oral tract but involves no expansion or constriction of either the oral or the pharyngeal tracts.

Coronals constitute the largest group of sounds in the world's languages (Keating 1991); therefore, if a purely articulator-only theory is to have trouble distinguishing all the phonemes in a language this will be most evident within the [coronal] group. In the majority of feature geometry models, the [coronal] articulator node has the dependent terminal nodes [anterior] and [distributed] (here described as phonetically grounded prime features). In many models, these terminal features are also bivalent. As I demonstrate here, the [coronal] phonemes in Cairene and San'ani can be distinguished by the phonetic interpretation of place features; however, certain [coronal] phonemes require the additional specification of a non-primary feature [dorsal]. The phonetic interpretation of primary [coronal] is given in (30).

(30) *The phonetic interpretation of primary [coronal]*

1. A primary [coronal] stop is dental–alveolar (*t*, *d*).
2. A primary [coronal] fricative is dental–alveolar (*s*, *z*).
3. A primary [coronal] vocoid is central (*ɹ*, *ə*).

In the vocoid series, [coronal] represents the lax vowel schwa *ə* and the approximant *ɹ*. Of these sounds, schwa is an optional unstressed allophone of any of the short vowel phonemes /i, u, a/ in San'ani and an optional unstressed allophone of the high vowels in Cairene. The other [coronal] vocoid, *ɹ*, plays no role in the phonological system of either dialect.

As it stands, the phonetic interpretation of primary [coronal] does not account for the interdental fricatives /t̲/ and /d̲/ and the palatoalveolar affricate /ʤ/ in San'ani, nor for the palatoalveolar fricative /š/ attested in both San'ani and Cairene: a primary [coronal] fricative or stop is dental–alveolar. In a number of articulator-plus accounts of the interdentals and palatoalveolars, [coronal] has an additional daughter node, [distributed] (e.g. Spencer 1984; Keating 1988, 1991). [Distributed] sounds are produced with a constriction 'that extends a considerable distance parallel to the direction of the airflow' (Kenstowicz 1994: 30), while sounds lacking [distributed] are produced with a constriction that extends for a short distance along the direction of the airflow. In such a model, the interdentals are distinguished from the palatoalveolars by [+anterior] (versus [−anterior]). I suggest that a [coronal]-only account can be maintained by accepting, in line with more

traditional accounts, that the interdentals and palatoalveolars are universally less basic sounds than the dental–alveolars, but by allowing this relative markedness to be represented by the non-primary feature [dorsal].[13,14]

If we return to the phonetic interpretation of primary [dorsal] in (23), we see that while a primary [dorsal] consonant is velar, a primary [dorsal] vocoid is palatal. According to the Rank–Stricture Correspondence (9c), 'The degree of constriction in the articulation realizing a non-primary place feature in a segment does not exceed the degree of constriction of the articulation of a primary place feature in the same segment'. A non-primary stricture therefore tends to be more vowel-like and to involve more movement than a primary stricture. Thus, while primary [dorsal] involves raising the dorsum to touch the velum in consonants, non-primary [dorsal] is interpreted broadly as pharyngeal expansion with no commitment regarding the degree of stricture (cf. Section 3.4.10). In the unmarked case, pharyngeal expansion also involves dorsum raising. Pharyngeal expansion and dorsum raising in a primary [coronal] segment results in a palatoalveolar. We therefore represent the palatoalveolars as primary [coronal] and non-primary [dorsal].

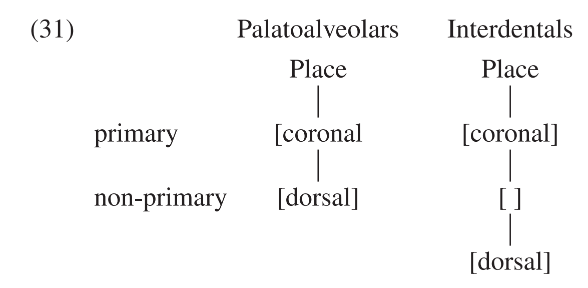
The interdentals have a more fronted tongue-body position than the dental–alveolars (Smith 1988: 214). They exhibit the pharyngeal expansion characteristic of the palatoalveolars, but not the dorsum raising.[15] In common with the palatoalveolars, the interdentals involve a lengthened constriction. The similarity between the interdentals and the palatoalveolars is captured by shared basic place features—primary [coronal] and non-primary [dorsal]. The difference between the two sets of sounds is represented by the differing status of non-primary [dorsal]: secondary [dorsal] in the case of palatoalveolars, and tertiary [dorsal] in the case of the interdentals. The secondary–tertiary distinction is motivated by the fact that the interdentals exhibit a sub-set of the [dorsal] effects (pharyngeal expansion and lengthened constriction), while the palatoalveolars exhibit the full set of [dorsal] effects (pharyngeal expansion, dorsum raising, and lengthened constriction). As discussed above (see Section 3.4.1), the feature–node theory adopted here enables us to represent the interdentals with an empty secondary place node. The place-feature representations of the interdentals and the palatoalveolars are given in (31).

[13] Several languages which have dental–alveolar /s/ lack palatoalveolar /š/, but it is rare for a language to have /š/ without /s/ (cf. Kenstowicz 1994: 30; cf. Hall 1997: 91). In addition, just as palatalization of dental–alveolar /t/ and /d/ in some sociolects of Cairene results in affricates [tš] and [ʤ] (Haeri 1997), so /s/ in some dialects of northern Yemeni and Tunisian is realized as [š] in the environment of a [dorsal] vowel /i/.

[14] Similar representations of the interdentals and palatoalveolars have been presented in different phonological frameworks: Smith (1988) captures the dental–alveolar distinction in a particle approach with an I [= coronal] head and an I [= fronting] dependent for the dentals: in Broadbent's (1999) approach the interdentals are represented with A [= coronal] head, I [= palatality] dependent, but the palatoalveolars with A and I having equal status. An equal status representation of primary features is not possible in an articulator-only approach, however, since representations with dual primary place are ruled out by the No Dual Primary Place constraint (11).

[15] However, they do exhibit tongue raising at the front of the vocal tract.

(31)



The palatoalveolars are distinguished from one another by the laryngeal feature [voice] and the stricture feature [cont]. The interdentals are distinguished from one another by the laryngeal feature [voice]:

(32)

	ṯ	*ḏ*	*š*	*ʤ*
[cont]	+	+	+	
[strid]			+	+
[voice]		+		+

The class of coronal phonemes in Arabic is further differentiated by a combination of the root feature ([son]), the laryngeal feature ([voice]), the stricture features ([cont], [nasal], and [lateral]), and the acoustic feature ([strident]). Consider the matrix of plain [coronal] phonemes in San'ani, set out in (33).

(33) SA [coronal]s

	ṯ	*ḏ*	*t*	*d*	*ʤ*	*s*	*z*	*š*	*n*	*l*	*r*
[son]									+	+	+
[voice]		+		+	+		+		+	+	+
[cont]	+	+				+	+	+			+
[lat]										+	
[nasal]									+		
[strid]					+	+	+	+			
n-p [dorsal]	+	+			+			+			

From this matrix, specification of [voice] can be removed from the [sonorant]s, since [sonorant]s are redundantly voiced (see (16) above). We can remove the specification [son] from the [nasal] phoneme, since [nasal]s are redundantly [son] (see Section 3.1); similarly, we can remove the [son] specification for the [lateral] phoneme, since [lateral]s are redundantly [son]. The latter redundancy rule is set out in (34).

(34) *Redundancy rule*

[lateral] → [sonorant]

In the underspecified matrix in (35), no phoneme has more than three feature specifications, and /t/, which is the lexical default consonant in San'ani, as it is in Cairene and many of the world's languages (Broselow 1984 for Amharic; Watson 1989 for rural dialects of Yemeni Arabic; Paradis and Prunet 1989 for Fula, Guere, and Mau; Davis 1991 for English; Rice and Avery 1991), predictably has no underlying specification at all.

(35) SA [coronal]s

	ṯ	*ḏ*	*t*	*d*	*ʤ*	*s*	*z*	*š*	*n*	*l*	*r*
[son]											+
[voice]		+		+	+		+				
[cont]	+	+				+	+	+			+
[lat]										+	
[nasal]									+		
[strident]					+	+	+	+			
n-p [dorsal]	+	+			+			+			

In the underspecified matrix for the Cairene plain [coronal]s, non-primary [dorsal] is only implemented to distinguish /š/ from /s/, since Cairene has neither the palatoalveolar affricate nor the interdental fricatives attested in San'ani—see (36).

(36) CA [coronal]s

	t	*d*	*s*	*z*	*š*	*n*	*l*	*r*
[son]								+
[voice]		+		+				
[cont]			+	+	+			+
[lat]							+	
[nasal]						+		
[strident]			+	+	+			
n-p [dorsal]					+			

Since Cairene lacks a sibilant affricate underlyingly (either /ts/ or /ʤ/), a language-specific redundancy rule could be invoked to specify that the presence of the acoustic feature [strident] implies the presence of the stricture feature [cont]:

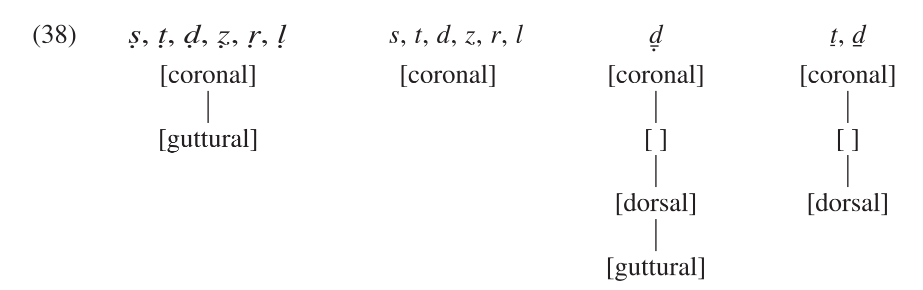
(37) *Language-specific redundancy rule (CA)*

[strident] → [continuant]

3.4.7 *The representation of the pharyngealized coronals*

The pharyngealized dentals and interdentals, /ṣ, ṭ, ḍ, ḏ̣, ẓ, ṛ, ḷ/, are produced with primary [coronal] accompanied by pharyngeal constriction. Phonologically, the Arabic pharyngealized coronals are distinguished from the plain coronals by non-primary [guttural]—see (38).

(38)



The core pharyngealized coronals are distinguished from one another by the (tertiary) non-primary feature [dorsal] (31) and the acoustic feature [strident] in San'ani,[16] but by the stricture feature [cont] and the laryngeal feature [voice] in Cairene. The matrix for San'ani is as in (39).

(39) SA pharyngealized coronals

	ṭ	*ṣ*	*ḏ̣*
n-p [dorsal]			+
[strident]		+	

The matrix for the core pharyngealized coronals in Cairene is as below:

(40) CA pharyngealized coronals

	ṭ	*ṣ*	*ḍ*	*ẓ*
[voice]			+	+
[cont]		+		+

Matrices (39) and (40) are already maximally underspecified, therefore no feature-values can be removed. As predicted, the most highly marked emphatic in the Cairene system, /ẓ/, requires two non-place feature specifications ([voice] and [strident]), whereas all other emphatics require one (/ṣ/ and /ḍ/ in Cairene, /ḏ̣/ in San'ani) or, in the case of the least marked emphatic (/ṭ/), none.

Cairene has two marginal pharyngealized labials, /ḅ/ and /ṃ/ (see Sections 2.1.1 and 2.3). The pharyngealized labials are represented as primary [labial] and non-primary [guttural]:

(41) *ḅ*, *ṃ*

[labial]
|
[guttural]

3.4.8 *The representation of the uvulars*

The uvular stop /q/ (and uvular fricatives for dialects in which [dorsal] fricatives are phonologically uvular) are distinguished from other [dorsal] sounds by specification for non-primary [guttural] in addition to primary [dorsal]. Thus, they are taken to be the emphatic counterparts of the dorsals. As we will see in Chapter 10, the uvular stop in Cairene has a similar phonetic effect on adjacent vowels to the pharyngealized coronals, as shown in (42).[17]

[16] Recall that the coronals form voiceless–voiced–emphatic triads in San'ani, in contrast to Cairene, and thus voice is non-distinctive in the San'ani emphatics.

[17] Jakobson (1957) puts forward arguments for the uvular fricatives /χ/ and /ʁ/ to be considered the emphatic counterparts of the palatoalveolar fricatives /š/ and /ž/ in the Arabic dialect of the North Palestinian Druze. If we assume the palatoalveolar fricatives in this dialect have a non-primary [dorsal] feature, we could claim that in dialects in which they are attested, the uvular fricatives /χ/ and /ʁ/ are, at least in some way, the emphatic counterparts of the palatoalveolars.

(42)

q, χ, ʁ	*k, g*
[dorsal]	[dorsal]
|	
[guttural]	

The uvulars are distinguished from one another by the stricture feature [cont] and the laryngeal feature [voice]:

(43)

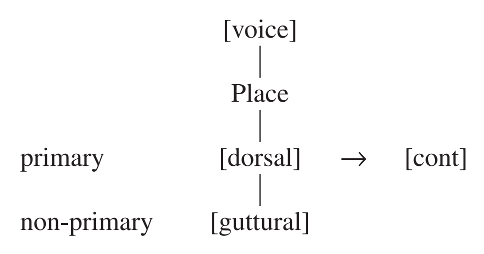
	q	*χ*	*ʁ*
[cont]		+	+
[voice]			+

Since a voiced uvular is also [cont], the [cont] value for /ʁ/ could be removed as language-specifically predictable (45) from the feature combination to provide the maximally underspecified matrix in (40).

(44)

	q	*χ*	*ʁ*
[cont]		+	
[voice]			+

(45) *Language-specific redundancy rule*



3.4.9 *The representation of the pharyngeals*

The pharyngeals /ḥ/ and /ʕ/ are distinguished from the laryngeals by non-primary [guttural]. Thus, the pharyngeals are taken to be the emphatic counterparts of the laryngeals—see (46).

(46)

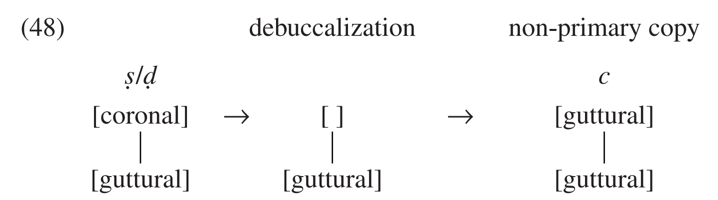
ḥ, ᶜ	*h*, *ʔ*
[guttural]	[guttural]
|	
[guttural]	

An analysis of the pharyngeals as emphatic is not new: Jakobson recognizes /ḥ/ and /ᶜ/ in Arabic as essentially pharyngealized laryngeals and says that in some dialects of Arabic the phonetic affinity of /ᶜ/ and /ʔ/ is reinforced by a glottal closure which accompanies at least the *anlaut* variant of /ᶜ/. He also argues that when emphatics lose the features generated in the mouth resonator, the phoneme becomes a mere pharyngeal. In this regard, he cites Panconcelli-Calzia (1916)

who states that the emphatic *ṣ* in Aramaic is fairly regularly replaced by ^{c} (Jakobson 1957: 113). McCarthy produces a similar analysis of the sound change **ḍ* to ^{c} in Aramaic, comparing Arabic *ʔarḍ* with Aramaic *ʔara*^{c} 'earth': the primary [coronal] articulator is lost and the secondary [pharyngeal] feature is promoted (McCarthy 1994: 220). If the pharyngeals are emphatic laryngeals a sound change from a pharyngealized coronal to a pharyngeal is to be expected, given that sounds lose their oral features when they debuccalize, but retain their non-oral features: in many varieties of Scots, the stops /p, t, k/ debuccalize to [ʔ] after a stressed vowel (with an optional intervening nasal or liquid), before an unstressed vowel, a syllabic nasal or a word boundary; in lexically restricted cases, the fricative /t̠/ debuccalizes to [h] (Lass 1984: 114–15). Lass represents debuccalization as the loss of the oral component and the retention of the laryngeal component:

(47)
```
[oral]            0
  |       →       |
[laryng]      [laryng]
```

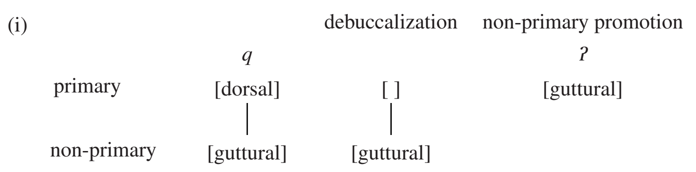
In the current model, debuccalization of an emphatic coronal in Aramaic is represented as deletion of the primary specification, with the empty primary specification filled by a copy of the non-primary specification:[18]

(48)


3.4.10 *The phonetic interpretation of non-primary [guttural]*

In this model, pharyngealized and pharyngeal segments are analysed as sharing a non-primary feature [guttural], where non-primary [guttural] is interpreted broad-

[18] There is a problem with the analysis of **q* > /ʔ/ in metropolitan Arabic dialects such as Cairene. If **q* is the emphatic counterpart of /k/, we would expect **q* to debuccalize to /^{c}/ rather than to /ʔ/. In no documented modern dialect of Arabic is /ʕ/ the reflex of **q* : **q* either loses its non-primary articulation and becomes a mere velar stop, or it loses its primary ([dorsal]) articulation and becomes a glottal stop. I assume here that the historical sound change **q* > /ʔ/ which took place in Cairene and other metropolitan dialects is the result of debuccalization followed by promotion of the non-primary articulation (as in Selkirk 1993). This is diagrammed in (i).

(i)


M. Woidich (p.c.) suggests the development of **q* > /ʔ/ could have started with a glottalized reflex of **q*, as attested today in Kharga Oasis.

ly as pharyngeal constriction. Thus, pharyngealized coronals are represented as the emphatic counterparts of plain coronals, pharyngealized labials as the emphatic counterparts of plain labials, uvulars as the emphatic counterparts of velars, and pharyngeals as the emphatic counterparts of laryngeals. However, the degree and position of pharyngeal constriction for each sub-set of segments is not identical: in the pharyngealized coronals and labials and the uvulars, pharyngeal constriction occurs in the upper pharynx; whereas in the pharyngeals, constriction takes place in the lower pharynx. Similarly, while spread from a pharyngeal results in vowel lowering, spread from a pharyngealized oral consonant tends to result in centralization of [dorsal] vowels and both lowering and retraction of [guttural] vowels (Harrell 1957; Broselow 1976; Woidich 1999 for Cairene). As we will see in Chapter 10, spread from a pharyngealized coronal may target the entire phonological word in both dialects, whereas spread from a pharyngeal (or uvular stop in Cairene) is restricted to adjacent vowels only.

The surface differences in pharyngeal constriction between the pharyngealized oral consonants and the pharyngeals and the difference in the extent of spread from these sounds are predictable from the principles of phonetic realization, however, and are due to the combinatorial effect of the two places of articulation involved: with the pharyngealized coronals, primary [coronal] restrains the tongue dorsum to restrict the pharyngeal effect of non-primary [guttural] at the same time as non-primary [guttural] tends to retract the tongue tip from the dental region towards the alveolar ridge (Ali and Daniloff 1974; McOmber 1996: 251–2; Zemánek 1996: 4; cf. Harrell 1957: 71, n. 8); in the pharyngeals, the primary place is the larynx, and therefore the pharyngeal effect of non-primary [guttural] is not moderated in the mouth. The non-primary constriction of the pharyngeals is consequently lower and closer to the larynx than that of the pharyngealized coronals or the uvulars. The combinatorial effect of primary and non-primary [guttural] can be represented as the default rule in (49).

(49) [guttural]
 | → [constricted lower pharynx]
[guttural]

By attributing surface differences in pharyngeal constriction to the primary rather than to the non-primary feature, I reach the same conclusion obtained by Hess for her factor analysis of X-ray tracings of pharyngeals, pharyngealized coronals and vowels and non-pharyngealized segments spoken by two speakers of Damascene Arabic and one speaker of Tunisian Arabic. Despite differences in pharyngeal constriction between pharyngeals and pharyngealized coronals, she concludes that the same factor is responsible for the pharyngeal constriction, and ascribes surface differences to 'the influence of the tongue blade in the pharyngealized segments' (Hess 1990: 13, cited in McCarthy 1994: 202). This observation is in line with the Phonetic Interpretation of Place Features in (9), which states that the realization of a non-primary feature 'may be independent of the other features of the segment containing it, or it may be contingent on the other place and/or stricture features

of the segment'. In contrast to [labial], which in its non-primary instantiation is realized in the default case as rounding irrespective of the identity of the primary feature,[19] the different phonetic realizations of non-primary [guttural] result from the dependence of the feature on other place features and, in the case of primary [dorsal] segments, on stricture features of the segment.

3.4.11 *The representation of the vowels*

The three short vowels in Arabic, /a, i, u/, are distinguished from their corresponding glides or non-syllabic counterparts, /h, ʔ, y, w/, by syllable position only. Vowels have the features [son], [cont], and [voice], of which [voice] is predictable from the specification [son], and [cont] is predictable from the combination of absence of [cons] and presence of [son]. Vowels are distinguished from one another by the place features [guttural], [dorsal], and [labial]. Of these, /a/ is distinguished by the feature [guttural], /i/ by the feature [dorsal] (with non-primary [dorsal] assigned by default, see (24)) and /u/ by the primary feature [dorsal] and the non-primary feature [labial]—see (50).

(50)

a	*i*	*u*
[guttural]	[dorsal]	[dorsal]
	|	|
	([dorsal])	([labial])

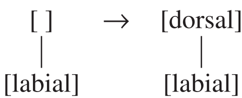
This is presented in matrix form in (51).

(51)

	a	*i*	*u*
[guttural]	+		
[dorsal]		+	+
[labial]			+

There are no primary [labial] vowels in the two dialects (in the vocoid set [labial] always functions as a daughter to [dorsal]); therefore the primary specification [dorsal] can be removed from the matrix for /u/, since [dorsal] is predictable from the redundancy rule in (52).

(52) *Vowel redundancy rule*



[19] This is the case in Arabic and in the majority of languages in which secondary labialization is attested. However, for certain languages—Abkhaz, for instance—the phonetic interpretation of non-primary [labial] may depend on other place and stricture features of the segment (Selkirk 1993: 63–4, citing data from Catford 1972: 679–81).

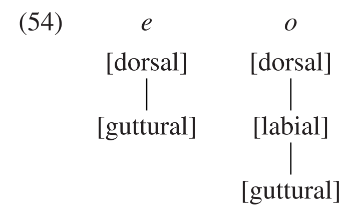
The underspecified vowel matrix appears as in (53).

(53)

	a	*i*	*u*
[guttural]	+		
[dorsal]		+	
[labial]			+

The additional long vowels /ē/ and /ō/, which are derived historically from the diphthongs **ay* and **aw* in Cairene, are represented as primary [dorsal] and non-primary [guttural] and primary [dorsal] and non-primary [labial] and [guttural], respectively—see (54).

(54)



These mid-vowel phonemes in Cairene are subject to a constraint prohibiting them from association with a single mora. This constraint—see (55)—holds in all but the most careful speech of educated speakers (cf. Woidich 1999: 26).

(55) *μ
|
e/o

3.5 CONCLUSION

In this chapter I have outlined the feature geometry model assumed for the underlying specification of the phonemes of Cairene and San'ani. Within the discussion, I have demonstrated that by allowing the phonetic interpretation of place features to take place, an abstract reductionist theory of the feature repertoire is sufficient to account for all the phonemes in the language. I argued that the well-documented [coronal] representation of palatal vocoids fails to fulfil two of the basic criteria for phonological features,[20] and that an articulatorily appropriate and necessary and sufficient representation of palatal vocoids can be achieved by maximizing the cover feature [dorsal]. The only vocoids represented by [coronal] are the central vocoids *ɹ*, *ə*, of which only schwa (*ə*) plays any role in the phonological system of the dialects discussed in this book. In the discussion of emphasis spread in Chapter 10, it will be shown that phonetically non-primary [coronal] may have a central-

[20] 1. Phonological features are articulatorily appropriate, and 3. Phonological features are sufficient and necessary to account for phonological processes in the language.

izing effect on vowels. I also assume that monovalent features are both necessary and sufficient to account for all phonological processes in the language. In Chapter 9 it will be shown that the apparent spread of negative feature-values in the anticipatory devoicing of stops in Cairene and San'ani is due to the licensing of [voice] in obstruents if and only if followed by a sonorant: obstruents in coda position take their voicing value either from this condition, or from the anticipatory spread of [voice] from an adjacent voiced onset (see Sections 9.2.5–6).

4

SYLLABLE STRUCTURE AND SYLLABIFICATION

This chapter examines the syllable structure and syllabification of San'ani and Cairene. I begin by discussing the syllabic skeleton and present arguments in favour of moraic theory over X-slot (or onset–rhyme) theory. Within the consideration of syllable structure, I discuss the analysis of apparent CVCCC syllables in San'ani in view of the fact that syllables in Arabic are commonly held to be maximally bimoraic. I support the proposal that syllables in Arabic are maximally bimoraic and claim that CVCCC syllables in San'ani can be properly analysed as marked variants of CVCC syllables: the only two consonants which occur in final position in CVCCC syllables, *tš*, are exceptionally linked to a single consonant slot. Under syllabification, I consider four syllable-related processes in the dialects: epenthesis, glottal stop prosthesis, closed syllable shortening, and syncope. While syllable-related processes are strictly structure-preserving in Cairene, in San'ani, closed syllable shortening and syncope are not always structure-preserving: word-internal CVVC syllables are attested optionally in derived environments, and syllables with initial clusters of up to three consonants—many of which disobey the Sonority Sequencing Principle—arise as a result of syncope. I demonstrate, however, that syllables are maximally bimoraic at the postlexical as well as the lexical level in San'ani as in Cairene, and that word-internal CVVC syllables in San'ani arise from Adjunction-to-Mora by which a syllable-final mora comes to dominate two constituents, VC, exceptionally (Broselow 1992: 14). In the case of derived initial consonant clusters, I argue that syncope frequently deletes the vowel of a syllable, but not the mora. Where the initial consonant (the consonant to the left of the syncopated vowel) is more sonorous than the following consonant (the consonant to the right of the syncopated vowel), the freed-up mora reassociates with the initial consonant; where the initial consonant is less sonorous than the following consonant, on the other hand, the mora is deleted together with the vowel. Thus, while only vowels are lexically stipulated as syllable peaks in San'ani, syllabic consonants arise post-lexically, particularly in word-initial position.

4.1 ASSOCIATION AND THE SYLLABIC SKELETON

There are two current views of the syllabic skeleton in generative phonology—X-slot, or onset-rhyme theory, and moraic theory. X-slot theory has developed from the original theory on the syllabic skeleton, CV theory (McCarthy 1979*a*,

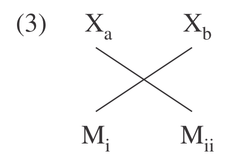
1981; Halle and Vergnaud 1980), in which the skeleton was posited as a string of pre-specified syllabic and non-syllabic slots. In X-slot theory, the skeleton is defined as a sequence of empty positions or slots labelled as X (Kaye and Lowenstamm 1984; Levin 1985). In all theories which acknowledge the existence of a syllabic skeleton, elements of the segmental (or melodic) tier associate with elements of the skeleton in accordance with the Universal Association Convention (UAC):

(1) *Universal Association Convention*
Associate autosegments and autosegment-bearing units one to one, left to right (cf. Goldsmith 1976; McCarthy 1982; Archangeli 1984*a*; Pulleyblank 1986).

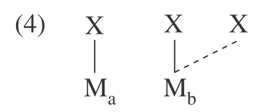
In the following CV and X-slot representations of the word *bint* 'girl' in Arabic, the UAC assures that /b/ associates with the leftmost skeletal position, /i/ with the second skeletal position, and so on:

(2) C V C C   X X X X
| | | | | | | |
b i n t   *b i n t*

Association between the melody and the syllabic skeleton is restricted by the Wellformedness Principle, which bans the crossing of association lines (Goldsmith 1976; Archangeli 1984*a*: 17; Hayes 1986: 323; Cole 1987: 13; Clements and Hume 1995). The Wellformedness Principle states that where M_i falls to the left of M_{ii} and X_a falls to the left of X_b, the following association is ill-formed.

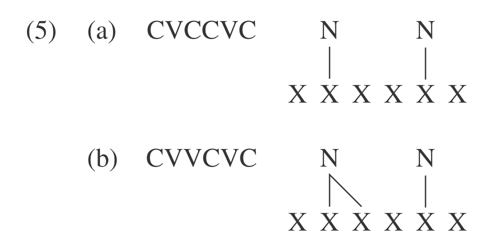
(3)


The Wellformedness Principle ensures that given four melodic elements, /bint/, and four skeletal positions, association results in [bint] and not *[tinb] or *[tibn]. In most grammars, association is also subject to the requirement that all templatic positions are matched with a melody (Goldsmith 1976; Farwaneh 1990: 120). This means that given two melodic units and three templatic positions, association takes place from left to right, one to one with the rightmost melodic unit spreading to associate with the unassociated templatic position. In the diagram in (4) and in subsequent diagrams, a solid line denotes an established link, while a broken line indicates a linking process in operation.

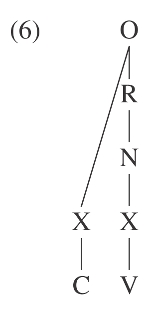
(4)


In the mid-1980s, Kaye and Lowenstamm (1984) and Levin (1985) proposed

replacing the CV skeleton by a sequence of empty positions labelled as Xs. The main motivation for the X-skeleton came from the observation that in some cases a skeletal position may associate with either a consonant or a vowel. A typical example is provided by the definite article in Tiberian Hebrew. The definite article geminates a following non-guttural consonant, as in: *ham-melek* 'the king'. If the following consonant is guttural, however, the vowel of the article lengthens, as in: *haa-ᶜiir* 'the city'. If the definite article template includes an empty X-slot, it is free to link to any segment regardless of feature content. For lexical forms in which a distinction between consonantal and vocalic slots is crucial, such as the Arabic templates for form II and III verbs, CVCCVC and CVVCVC, the vocalic slots are interpreted as X-slots pre-associated to a nucleus:

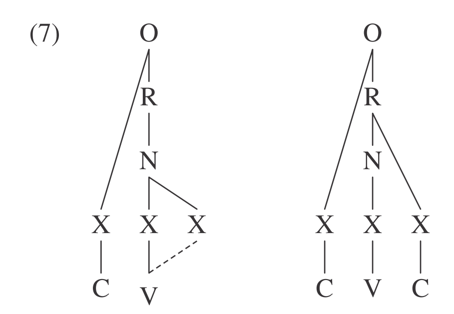


Under X-slot theory, syllable peaks are associated with the nucleus (N) of the syllable rhyme (R), and phonological weight is defined in terms of the presence or absence of two skeletal positions in the rhyme of a syllable. In a CV syllable, the V element is associated with one position in the rhyme, the nucleus (N).



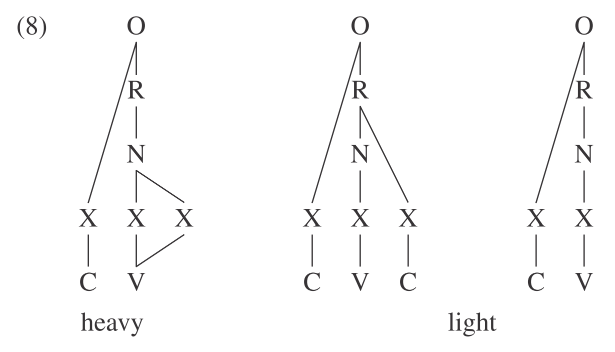
A heavy syllable, CVV or CVC, is associated with two positions in the rhyme. In a CVV syllable, the vocalic melody V associates with the leftmost nucleic X slot and spreads to the rightmost available X slot in accordance with the requirement that all templatic positions are matched with a melody—see (7).

(7)



CVV and CVC syllables are distinguished in that the second element of the CVV rhyme is associated with the nucleus (N) while the second element of the CVC rhyme is linked directly to the rhyme node (R). In languages such as Lardil and Cahuilla in which CVC syllables count as light while CVV syllables count as heavy, heavy syllables are defined as those in which two skeletal positions are associated to the N node, as in:

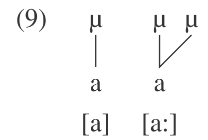
(8)



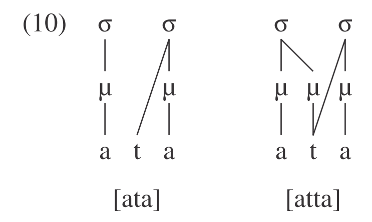
Under moraic theory (Hyman 1985; Hayes 1989, 1995; Broselow 1995 and others), the hierarchical structure of the X-slot skeleton has been dispensed with and only genuine prosodic positions, known as moras, are represented on the prosodic template: the only positions represented are those which in X-slot theory are associated with the nucleus in languages for which CV and CVC syllables are light and CVV syllables heavy, and with the nucleus and rhyme in languages for which CV syllables are light and CVV and CVC syllables heavy.

In all models of moraic theory, short vowels are associated with a single mora while long vowels are associated with two moras, as in (9).

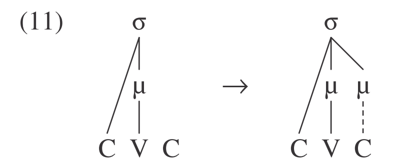
(9)



In Hayes (1989) and others, long (geminate) consonants are distinguished from short consonants as underlyingly monomoraic versus underlyingly non-moraic. Under this account, the hypothetical forms *ata* and *atta* receive the derivations in (10).

(10)


Since single consonants are underlyingly weightless, they must be assigned a mora when they occupy the coda of a heavy syllable. This is achieved by the Weight-by-Position condition which assigns a mora to a coda consonant in languages for which CVC syllables are prosodically heavy. The Weight-by-Position condition is restricted to a single application, ensuring that syllables in general will respect a bimoraic limit, as in (11).

(11)


The three principal aspects of Hayes's (1989) version of moraic theory are summed up under Sources of Syllable Weight in (12) (cf. Piggott 1995: 284, 287):

(12) *Sources of Syllable Weight*
- (a) Short vowels contribute one mora and long vowels two moras (universal).
- (b) Geminate consonants contribute one mora (universal).
- (c) Weight-by-Position: a 'coda' consonant is assigned a mora in the course of syllabification (parametric).

I adopt moraic theory in preference to X-slot theory for a number of reasons. Firstly, X-slot theory gives equal status to every segment irrespective of weight, while moraic theory develops a prosodic conception of the syllable, giving status only to those segments which bear weight and are potentially stressable. Segments in the rhyme are potentially stressable and bear weight, while segments in the onset have been shown to have no effect on stress assignment—a syllable with a complex onset *st-* or *str-* is no heavier than a syllable with a simple onset *s-*. Secondly, moraic theory captures the fact that metrical stress templates group moras. A common stress pattern equates a single heavy syllable (H) with two successive light (L) syllables. (H) and (LL) constituents can be analysed as arising from a pro-

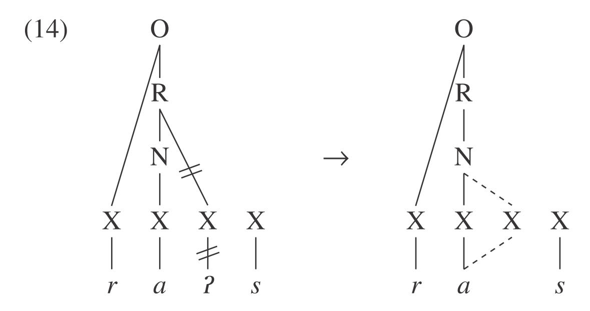
cedure which groups two successive moras irrespective of whether the moras fall in a single syllable or two successive syllables. By contrast, no prosodic process groups successive X-slots: (*at*), (*aa*)*ta*, (*ta*)*ta* and (*tr*)*apa* are prosodically incoherent (Kenstowicz 1994: 431). Thirdly, moraic theory provides an economical means of capturing phenomena such as compensatory lengthening (cf. Hayes 1989): in the historical development of Cairene *rās* 'head' from Classical Arabic **raʔs*, the pre-consonantal glottal stop is deleted; this frees up the right-hand mora into which the short vowel spreads, as in (13).

(13) μ μ → μ μ

r a ʔ s *r a s*

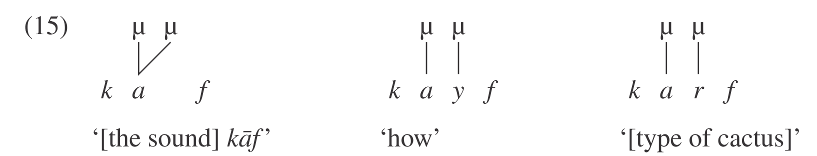
Under X-slot theory, by contrast, an additional operation is required: not only is the consonant deleted from the X slot, but X is disassociated from the rhyme node (R) and reassociated with the nucleus node (N), as in (14):

(14)



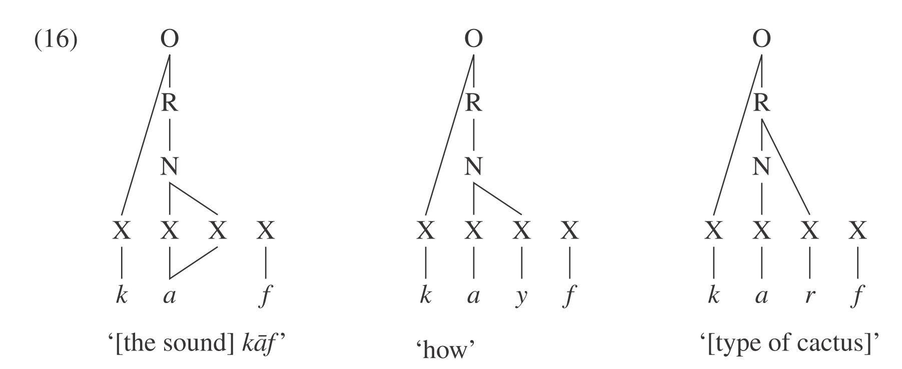
A potential problem does arise with moraic theory, however, in the treatment of diphthongs. In Arabic, diphthongs are represented as adjacent melodic units (/a + y/ or /a + w/) linked to adjacent moras and not as diphthongal units (/ai/ or /au/) linked to two moras. This is due to the fact that glides commute with sound consonants in Arabic. Thus, *kayf* 'how' has the triliteral root /k-y-f/ just as *karf* '[type of cactus]' has the triliteral root /k-r-f/. In X-slot theory, diphthongs have a status independent of both long vowels and vowel–consonant sequences by virtue of the intervening X-tier. In moraic theory, on the other hand, they are treated as identical to vowel–consonant sequences: there is no structural difference between the sequences -*arf* and -*ayf*. The moraic representations of San'ani *kāf*, *kayf*, and *karf* are given in (15).

(15)



'[the sound] *kāf*' 'how' '[type of cactus]'

Within the hierarchical representations of X-slot theory, by contrast, /y/ of /ay/ is treated as part of a branching nucleus—see (16).

(16)


'[the sound] *kāf*' 'how' '[type of cactus]'

In X-slot theory, diphthong-shortening in San'ani, as exemplified in (53)–(55) below, is represented as delinking of the second element of the diphthong from the nucleus node N with resyllabification attaching the adjacent unsyllabified consonant directly to the R node. In moraic theory, however, there is no structural difference between *kayf* 'how' and *karf* '[type of cactus]', therefore /y/ of the diphthong needs to be marked as subject to deletion in specific environments, and diphthong-shortening is by no means represented as a natural or predictable outcome.

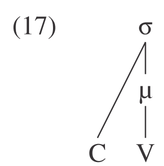
4.2 SYLLABLE STRUCTURE

Most eastern Arabic dialects exhibit a fairly limited range of syllable types. Three basic syllables are attested in Cairene and San'ani: CV, CVV, and CVC. In both dialects, CV counts as a light syllable, while CVV and CVC count as heavy syllables. CV does not occur in utterance-final position in San'ani, and, with very few exceptions,[1] CVV does not occur in phonological word-final position in Cairene. That Cairene does not usually allow word-final CVV syllables is a result of the history of the dialect when long final vowels were reduced to short final vowels (Birkeland 1952: 25). In utterance-final position, laxing continues today in the dialect: in utterance-final CV syllables where V is /i/, as exemplified by *katabti* 'you f.s. wrote', *maṣri* 'Egyptian' and *ṭardi* 'my parcel', /i/ is often elided or reduced to schwa (Fischer 1969: 67).

The minimal syllable in the two dialects is monomoraic with an obligatory onset, as in (17).

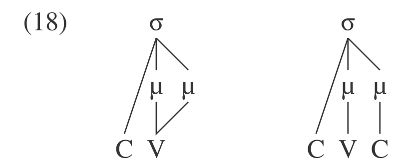
[1] In Cairene, long domain-final vowels are found in loan words, such as *gatō* 'gateau', and where the zero allomorph of the {third person masculine singular} object suffix is attached to vowel-final forms, as in *šafū* 'they saw him', *maskā* 'holding f.s. it m.'. In the latter case, this is a result of pre-suffix vowel lengthening (see Section 8.1.1).

(17)



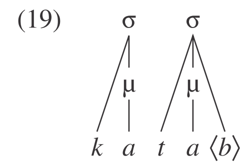
The maximal syllable in the two dialects is bimoraic: there is no weight distinction between CVV and CVC[2] syllables since both are prosodically heavy in Arabic, but only vowels and geminate consonants are assigned moras lexically. Where syllables are closed with a non-geminate consonant, the final consonant is assigned a mora through Weight-by-Position.

(18)

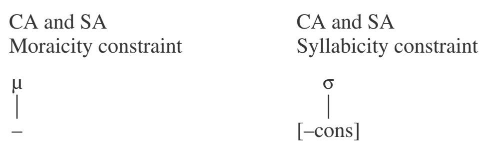


In domain-final position, CVC syllables are prosodically light in Cairene and San'ani. While a word-internal CVC syllable may be stressed in antepenultimate or penultimate position in San'ani and in penultimate position in Cairene, a word-final CVC syllable fails to be assigned stress in either dialect:[3] the word *katab* 'he wrote' is stressed on the initial light syllable *.ka.* and not on the final syllable *.tab*. In order to account for the fact that domain-final syllables usually require more elements to count as heavy than domain-internal syllables, a number of researchers (Liberman and Prince 1977; Prince 1983; Hayes 1979, 1995, for instance) propose that domain-final consonants are extrametrical in a number of languages (including dialects of Arabic). Consonant extrametricality is represented notationally by placing the final consonant in angled brackets, as in (19).

(19)



[2] There is no moraic constraint in either dialect (cf. Zec 1995: 115), but only vowels are lexically stipulated as syllable peaks. However, in San'ani, consonants can surface as syllable peaks:



[3] Exceptions in San'ani are discussed in Section 5.4.4.

The final consonant is syllabified in the final syllable at a later stage in the derivation. However, its extrametrical status renders it invisible to the Weight-by-Position condition, and it fails to be assigned a mora. In both dialects, a word-final CVC syllable therefore counts as monomoraic and not as bimoraic.

4.3 SUPERHEAVY AND 'SUPER-SUPERHEAVY' SYLLABLE TYPES

In addition to the basic syllable types considered above, there is a third syllable type, a 'superheavy' syllable, which is usually restricted to domain-final position.

(20)

CA	SA
CVVC	CVVC
CVCC	CVCC
***	CVCCC

CVVC is usually restricted to phonological word-final position in San'ani and, with a few lexicalized exceptions from Standard Arabic, is always restricted to phonological-word-final position in Cairene; CVCC is restricted to phonological word-final position in San'ani and to utterance-final position in Cairene; and CVCCC is restricted to phonological word-final position in San'ani, but is not attested in Cairene.

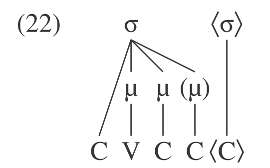
Domain-final consonants in superheavy syllables are prosodically licensed, not as extrametrical, but as extrasyllabic. In contrast to an extrametrical consonant which links directly to the syllable node of the final syllable, an extrasyllabic consonant is not incorporated into the adjacent syllable at any stage in the derivation (Aoun 1979: 140; Selkirk 1981;[4] Hayes 1979: 78; Kenstowicz 1994: 274; Kager 1995: 376).

(21)

```
        σ   ⟨σ⟩
       /|\   |
      / μ μ  |      =CVXC
     /  | |  |
    C   V X ⟨C⟩
```

An apparent problem arises with the analysis of San'ani final CVCCC syllables. If we claim that only the final consonant in the domain is extrasyllabic we end up with an apparent trimoraic syllable, as in (22).

[4] However, CVVC and CVCC syllables are not prosodically identical (Watson 1999*c*). Selkirk (1981) accounts for this prosodic disparity in an analysis whereby CVCC is analysed as a canonical syllable plus a degenerate syllable (CVC)(C), but CVVC is analysed as a single superheavy syllable. The prosodic distinction between CVVC and CVCC syllables is discussed in detail in Section 5.4.1.

(22) 

e.g. (*mā k*)*untš* 'I was not'

The CVCCC syllable type is, however, extremely restricted in occurrence, and almost all potential sequences of CVCCC (including CVVCC) are avoided in the dialect. Where the morphology concatenates a word ending in CVVC with the negative suffix -*š*, the long vowel VV may be reduced to V to give CVCC (cf. Section 4.4.1.3).[5]

(23) /*mā + kān + š*/ *mā kānš ~ kanš* 'he was not'
/*mā + yikūn + š*/ *ma ykūnš ~ ykunš* 'he is not'

Where the morphology concatenates a feminine plural morpheme, -*ayn*, with a consonant-initial suffix, the diphthong is shortened and simplified to give CanC:

(24) /*mā + gālayn + š*/ *mā gālanš* 'they f. didn't say'
/*mā + tištayn + š*/ *mā tištanš* 'you f.pl. don't want'
/*mā + antayn + š*/ *ma ntanš* 'you f.pl. are not'

And where the morphology concatenates a word ending in a geminate consonant, CVGG, with the negative suffix, the geminate consonant is degeminated (see Section 8.1.6) to give a CVCC structure, as in (25).

(25) /*mā + yiḥibb + š*/ *ma yḥibš* 'he doesn't like'
/*mā + bi-nihtamm + š*/ *mā bi-nihtamš* 'we don't care'
/*mā + ḥadd + š*/ *mā ḥadš* 'no one'

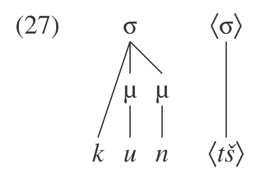
CVCCC syllables are restricted, therefore, not only in terms of phonological position, but also in terms of which consonants can occupy the final two positions. The only surface tokens of final CVCCC syllables in San'ani[6] involve final *tš* from the concatenation of the perfect aspect subject suffixes {first person singular} or {second person masculine singular} + {negative}:

(26) /*mā + libist + š*/ *mā libistš* 'I/you m.s. didn't wear'
/*mā + gult + š*/ *mā gultš* 'I/you m.s. didn't say'

We have two options: either we say that syllables are maximally bimoraic in San'ani unless either of the subject suffixes {first person singular} or {second person masculine singular} is concatenated with the negative suffix, in which case the maximal syllable is trimoraic; or we mark final *tš* as special in some way. I propose

[5] In these and the following three-column sets of examples, the underlying representation is given in the left-hand column, the realization in the centre column, and the gloss in the right-hand column.
[6] As in other modern dialects of Arabic for which domain-final CCC holds.

that final *tš* is analysed as an affricate. That is to say, although *tš* is derived from two different morphemes, on the surface it counts as a single consonant in San'ani and probably in other dialects of Arabic for which CVCCC syllables are attested. This analysis allows us to admit no more than a single extrasyllabic position and to admit the coronal affricate as a marked option in this position (cf. Wiese 1996: 48 for a similar analysis of *tš* in German). Thus, (*mā*) *kuntš* 'I/you m.s. was/were not' is represented as in (27).

(27)


The development of syllable-final *tš* in San'ani mirrors that of word-initial *ts*, *tz*, *tṣ*, *tš*, and *tj* in form V and VI triliteral and form II quadriliteral verbs. The detransitivizing prefix (see Section 6.5.4) produces syllable-initial clusters with the sibilants far more readily than with other consonants—see (28).

(28) *tsaᶜᶜal* 'to cough'
tšaršaf 'to wear the *širšaf*'
tzawwaj 'to get married'
tṣāfaṭ 'to hit each other in jest'
tjābar 'to converse'

With few exceptions, when the initial stem consonant is not a sibilant the detransitivizing prefix is realized as *ta*- before a guttural and *ti*- elsewhere (see Section 6.5.4). The examples in (28) compare with those in (29).

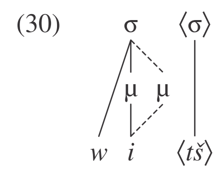
(29) *taḥākā* 'to talk'
taᶜaššā 'to have supper'
timašgar 'to wear flowers in one's hair'
tigabbab 'to become bitter'

Evidence for the analysis of *tš* as an affricate at some level in the phonology is adduced from the pronunciation of loan words. It is well known that when loan words are adopted into a language they are adapted to the phonological system of the borrower language. The word 'television' is adapted into San'ani as *tiliviziyūn* with -*ziy*- replacing the voiced palatoalveolar fricative of the source language. Here we see that the English word 'sandwich' is adapted into San'ani as *sanda'wītš*,[7] with the unsyllabified /d/ triggering epenthesis to conform to San'ani word-internal syllable structure and the final syllable attracting word stress. Interestingly for the argument at hand, /i/ of the final syllable is lengthened to produce a phonological-word-final CVVCC syllable. The lengthening of the vowel can be explained if *tš* is felt to constitute a single consonant (the voiceless equivalent of

[7] M. Woidich (p.c.) suggests that these words could have been taken over indirectly from Egyptian television series, rather than be direct loans from English.

the voiced palatoalveolar affricate /j/) at some level in the phonology. In this case, a final unlengthened syllable *-witš* would have the syllable structure CVC, which would normally fail to attract word stress. To enhance the prominence of the final syllable, word-final vowel lengthening is invoked to produce a superheavy syllable CVVC—see (30).

(30)



Further evidence for the analysis of *tš* as a single consonant is seen in the pronunciation of the loan words 'jug' as either *jāg* or *tšāg* and 'jelly' as either *jīlī* or as *tšīlī.* Furthermore, utterance-final devoicing and geminate devoicing of voiced obstruents produces [tš] as a voiceless allophone of the palatoalveolar affricate /j/, as in (31).

(31)	*/ranj/*	*ran*[*tš*]	'paint'
	/ḥajj/	*ḥa*[*t:š*]	'pilgrimage'

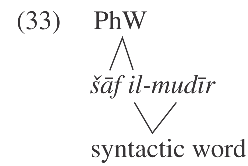
In contrast to San'ani, whenever VCt + *š* potentially arises in Cairene, the sequence *t* + *š* is broken up by epenthesis, as in (32).

(32) */ma + kunt + š/* *ma kunt*[*i*]*š* 'I/you m.s. was/were not'

For Cairene and other dialects of Arabic for which syllable-final C*tš* is not attested, *tš* is not analysed as an affricate at any level in the phonology.

4.4 SYLLABIFICATION

The main domain of syllabification is the phonological phrase in Cairene (however, cf. Section 4.4.1.1) and the phonological word in San'ani. The phonological word in both dialects consists of the word stem (cf. Section 6.4.2) plus any affixes. In the imperfect verb, the phonological word comprises the stem, any subject and object pronoun suffixes, the negative suffix and the imperfect prefix. A number of monomoraic particles including conjunctions and the habitual/continuous and future verbal prefixes may be procliticized to the phonological word, and have no effect on word stress. San'ani *fa-bi-tiktubūhā* 'so you m.pl. are writing it f.' consists of the phonological word *tiktubūhā* and the proclitics *fa-* (conjunction) and *bi-* (habitual/continuous). Cairene *wi-katab* 'and he wrote' consists of the phonological word *katab* 'he wrote' and the proclitic *wi-* (conjunction). Usually the phonological word is isomorphic with the syntactic word, but this is not always the case. In both dialects, the definite article (*il-* in Cairene, *al-* in San'ani) forms a syntactic unit with the following noun or adjective, but is phonologically encliticized to the preceding phonological word—see (33).

(33) 

In Cairene, prepositional phrases which complement a verb are invariably incorporated into the phonological word of the verb when they take a pronominal suffix. This is seen most clearly when the verb is negated by the discontinuous morpheme *ma + š* (Abdel-Massih 1975: 151, 152):

(34)			
	/ma + katab + lak + š/	*ma katablakš*	'he did not write to you m.s.'
	/ma + katab + lina + š/	*ma katablināš*[8]	'he did not write to us'
	/ma + katab + ha + lina + š/	*ma katabhalnāš*[9]	'he did not write it f. to me'

In San'ani, by contrast, a prepositional phrase complement can either be incorporated within the phonological word of the verb or function as a separate phonological unit:[10]

(35)				
	(a)	*/mā + katab + lanā + š/*	*mā katablanāš*	'he did not write to us'
	or	*/mā + katab + š + lanā/*	*mā katabš lanā*	'he did not write to us'
	(b)	*/mā + katab + lak + š/*	*mā katablakš*	'he did not write to you m.s.'
	or	*/mā + katab + š + lak/*	*mā katabš lak*	'he did not write to you m.s.'

The phonological phrase forms the main domain of syllabification in Cairene, and is generally isomorphic with the syntactic phrase and includes genitive structures, noun phrases, verb phrases, and participle phrases. In these cases, main stress is placed on the second element of the phrase, and syllable repair processes take place where necessary to produce a fully syllabifiable string. Consider the following examples of syllabified phonological phrases together with a note of the process required for exhaustive syllabification (dots delineate syllable boundaries):

(36)	*Underlying*	*Syllabified*	*Gloss*	*Process required*
	/fi + bīr + ġawīt/	*fi .bir. ġa.wīt*	'in a deep well'	closed syllable shortening
	/šāf + il-mudīr/	*ša.f il-.mu.dīr*	'he saw the manager'	unstressed long vowel shortening

[8] With pre-suffix vowel lengthening (see Sections 7.1.2 and 8.1.1).
[9] With pre-suffix vowel lengthening and syncope (see Section 4.4.2.1).
[10] These alternatives can be found in the speech of one and the same speaker.

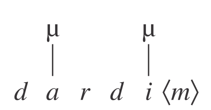
/kānit + imbāriḥ/	*kan.t im.bā.riḥ*	'it f. was yesterday'	unstressed long vowel shortening + syncope
/ša^{c}b + surīya/	*ša^{c}.b*[*i*]. *su.rī.ya*	'the people of Syria'	epenthesis

Syllabification takes place according to the algorithm in (37) (Clements 1990: 299):

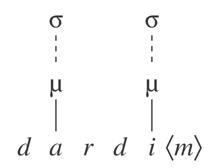
(37) (a) Consonant extrametricality: C > ⟨C⟩ /___]word.
(b) Associate moraic segments to a syllable node.
(c) Given P (an unsyllabified segment) preceding Q (a syllabified segment), adjoin P to the syllable containing Q iff P has a lower sonority rank than Q (iterative).
(d) Given Q (a syllabified segment) followed by R (an unsyllabified segment), assign a mora to R (Weight-by-Position) [iff R has a lower sonority rank than Q (iterative)].
(e) Adjoin moraic R to the syllable containing Q (iterative).

The algorithm in (37) is exemplified in the syllabification of Cairene *dardim* 'he filled up', given in (38).

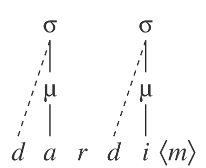
(38) (a) *Domain-final consonant extrametricality*



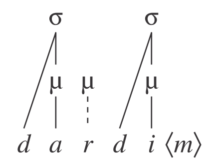
(b) *Association of moraic segments to a syllable node*



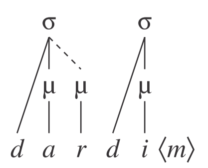
(c) *Association of onset to syllable node*



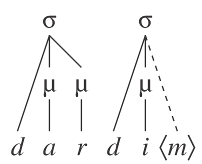
(d) *Assignment of mora through Weight-by-Position*



(e) *Adjunction of Weight-by-Position mora to syllable node*



(f) *Incorporation of extrametrical consonant into preceding syllable*



4.4.1 *Syllable repair processes*

Where the morphology concatenates a sequence which cannot be syllabified exhaustively according to the syllabification algorithm, one of three repair processes may be invoked: epenthesis of a vowel, prosthesis of a consonant, or closed syllable shortening. I shall consider these processes in order.

4.4.1.1 *Epenthesis*

Sequences of three consonants are anathema in Cairene (Broselow 1976: 1). Whenever three consonants are potentially juxtaposed within the utterance, epenthesis of [i] occurs between the second and third consonant. Within the word, but not across word boundaries, the epenthetic vowel is realized as [u] to the left of /u/.

(39)	*/ʔult + lak/*	*ʔult*[*i*]*lak*	'I told you m.s.'
	/kull + hum/	*kull*[*u*]*hum*	'all of them'
	/ša^{c}b + surīya/	*ša^{c}b*[*i*] *surīya*	'the people of Syria'
	/kunt + hina/	*kunt*[*i*] *hina*	'I/you m.s. was/were here'
	/bint + laṭīfa/	*bint*[*i*] *laṭīfa*	'Latifa's daughter'

While sequences of three consonants may occur in fast, connected speech in San'ani, in general epenthesis of [a] occurs when three consonants are juxtaposed within the phonological word, as in (40).

(40)	*/ḥajj + nā/*	*ḥajj*[*a*]*nā*	'our pilgrim m.'
	/ba^{c}d + mā/	*ba^{c}d*[*a*]*mā*	'after'
	/gabl + mā/	*gabl*[*a*]*mā*	'before'
	/gult + lih/	*gult*[*a*]*lih*	'I told him'
	/dafa^{c}t + lak/	*dafa^{c}t*[*a*]*lak*	'I paid you m.s.'

In careful speech, epenthesis also occurs across phonological word boundaries but within the phonological phrase (usually within a genitive structure or between two identical nouns) in San'ani when the initial word ends in a geminate consonant or in two consonants which share a primary place of articulation, and the following word is consonant initial.

(41)	*/ahamm + šay/*	*ahamm*[*a*] *šay*	'the most important thing'
	/lā + tigill + ^{c}an/	*lā tigill*[*a*] *^{c}an*	'it f. is not less than'
	/šigg + šigg/	*šigg*[*a*] *šigg*	'side-by-side'
	/jamb + jamb/	*jamb*[*a*] *jamb*	'side-by-side'
	/wasṭ + bayt/	*wasṭ*[*a*] *bayt*	'in the middle of a house'

Epenthesis also occurs within the phonological phrase when the initial word ends in two consonants which violate the sonority hierarchy, and the following word is consonant initial.

(42) */bi-šakl + ^{c}āmm/* *bi-šakl*[*a*] *^{c}āmm* 'in general'
/ibn + man/ *ibn*[*a*] *man* 'whose son'
/xidr + badawī/ *xidr*[*a*] *badawī* 'a bedouin abode'

In both dialects, the epenthetic vowel is inserted to the right of a stray consonant C′:

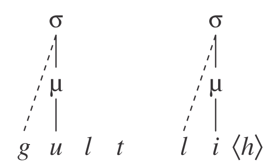
(43) (a) Cairene: 0 → [i] / CC′___C
(b) San'ani: 0 → [a] / CC′___C

Epenthesis is represented as the projection of a mora to the right of an unsyllabified consonant. Consider here the derivation of San'ani *gultalih* 'I/you m.s. told him' in (44).

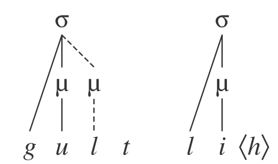
(44) (a) *Domain-final consonant extrametricality*



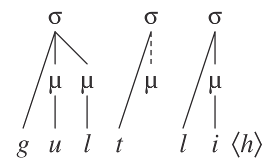
(b) *Onset formation*



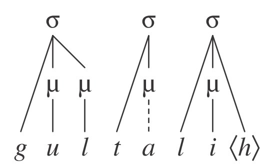
(c) *Weight-by-Position*



(d) *Unsyllabified* t *mapped to onset of epenthetic syllable and projection of mora*



(e) *Default rules and association of the default vowel* a *with the projected mora*

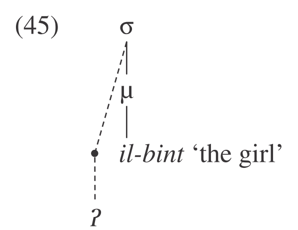


4.4.1.2 *Consonant prosthesis*

All syllables in Arabic require an onset. The majority of morphemes which may occur in utterance-initial position have an underlying initial consonant, and hence abide by this requirement. However, there are a few common vowel-initial morphemes in both Cairene and San'ani which may occur in utterance-initial position.

These include the definite article (*il-* in Cairene, *al-* in San'ani), the relative pronoun (*illi* in Cairene, *allaḏī* ~ *allī* ~ *illī* in San'ani), first- and second-person independent pronouns (e.g. *anā* 'I', *ant* 'you m.s.' in San'ani) and several loan words such as *iksibrēs* 'express'. Where these morphemes occur in utterance-initial position, the requirement for a syllable to take an onset is met through prosthesis of the minimal consonant, a glottal stop (cf. also Section 9.1.2.3).[11] Glottal stop prosthesis is represented in (45).

(45)



4.4.1.3 *Closed syllable shortening*

In Cairene, when the morphology concatenates a domain-final CVVC syllable to a consonant-initial morpheme within the phonological phrase, the long vowel is shortened to prevent the appearance of non-phonological-phrase-final CVVC syllables. In closed syllables, /ā/ is shortened to [a], /ē/ and /ī/ are shortened to [i], and /ō/ and /ū/ are shortened to [u]. Example (46a) exemplifies vowel shortening within the phonological word; (46b) exemplifies vowel shortening within the phonological phrase:

(46)	(a)	*/bāb + kum/*	*babkum*	'your pl. door'
		/fēn + ha/	*finha*	'where is she?'
		/yōm + ha/	*yumha*	'her day'
	(b)	*/šāf + muna/*	*šaf muna*	'he saw Muna'
		/ma-nīš + ᶜārif/	*ma-niš ᶜārif*	'I don't know'
		/fi bīr + ġawīt/	*fi bir ġawīt*	'in a deep well'

This process is described as Closed Syllable Shortening (CSS) and can be understood as the final (once extrasyllabic) consonant crowding out the vowel from the second mora to escape Stray Erasure (Kenstowicz 1994: 297). Morpheme-final consonants are extrasyllabic. When a consonant-initial element follows, the final consonant is no longer licensed as extrasyllabic and maps onto the second mora from which the vowel melody is delinked (Broselow 1992: 17):

(47) (a)
μ μ μ → μ μ μ
š a ⟨f⟩ + k u m → *š a f k u m* 'he saw you pl.'

[11] For arguments in favour of analysing the glottal stop as the default consonant in the post-lexical component, see Watson (1989: 209 ff.)

(b)
μ μ μ μ → μ μ μ μ
k i t a ⟨b⟩ + n a → *k i t a b n a* ‘our book’

In both Cairene and San’ani, CSS took place historically within the phonological word between the stem of verbs of the form CVVC (known as hollow verbs) and consonant-initial subject suffixes (see Section 6.5.6.3),[12] as exemplified in (48a)–(48b) for Cairene and (48c)–(48d) for San’ani.

(48) (a) Cairene

	ʔāl + 0	*ʔāl*	‘he said’
	ʔāl + t	*ʔult*	‘I/you m.s. said’
	ʔāl + na	*ʔulna*	‘we said’
cf.	*ʔāl + u*	*ʔālu*	‘they said’
(b)	*rāḥ + 0*	*rāḥ*	‘he went’
	rāḥ + t	*ruḥt*	‘I/you m.s. went’
	rāḥ + na	*ruḥna*	‘we went’
cf.	*rāḥ + u*	*rāḥu*	‘they went’

(c) San’ani

	gāl + 0	*gāl*	‘he said’
	gāl + t	*gult*	‘I/you m.s. said’
	gāl + nā	*gulnā*	‘we said’
cf.	*gāl + ū*	*gālū*	‘they m. said’
(d)	*sār + 0*	*sār*	‘he went’
	sār + t	*sirt*	‘I/you m.s. went’
	sār + nā	*sirnā*	‘we went’
cf.	*sār + ū*	*sārū*	‘they m. went’

In San’ani, as in Cairene, CSS also occurs between verbs and prepositional complements.

(49)	*/rāḥ + lih/*	*raḥlih*	‘he went off’
	/gāl + lī/	*gallī*	‘he said to me’
	/yigūl + lanā/	*yigullanā*	‘he says to us’
	/yibī^c + lak/	*yibi^{c}lak*	‘he sells to you m.s.’

CSS is optional in San’ani before the negative suffix -*š*.

(50)	*/(mā +) kān + š/*	(*mā*) *kanš* ~ *kānš*	‘he was not’
	/(mā +) dirīt + š/	(*mā*) *diritš* ~ *dirītš*	‘I/you m.s. didn’t know’

CSS takes place in San’ani between initial particles of the structure CVV and words with initial consonant clusters (usually resulting from syncope, see Section 4.4.2.2)—see (51).

[12] Historically, there are rather complex morpholexical rules of vowel alternation (for example, *a* ~ *i*) (cf. also Abu-Mansour 1992: 57).

(51) /*šā* + (a)*šraḥ*/ *šašraḥ* ‘I shall explain’
/*lā* + *tiṭawwulīš*/ *la tṭawwulīš* ‘don’t f.s. be long’
/*iḏā* + *rajamathā*/ *iḏa rjamathā* ‘if she threw it f.’
/*mā* + *nigūl* + *š*/ *ma ngulš* ‘we don’t say’

CSS also takes place in San’ani in the {third person masculine singular} inflectional form of hollow linking verbs when they are followed by a main verb. CSS in this case has the effect of reducing the prosodic status of the linking verb to that of a clitic.

(52) /*gām* + *raḥlih*/ *gam raḥlih* ‘he got up and went’
/*gām* + *yi*^{c}*sablahā*/ *gam yi*^{c}*sablahā* ‘he went and gave her money [as a present]’

Diphthong simplification occurs in similar contexts to CSS in San’ani, and can be considered an instance of CSS: when a feminine plural suffix -*ayn* takes the negative suffix -*š*, the diphthong is reduced to [a], as in (24), repeated here as (53) for convenience.

(53) /*mā* + *gālayn* + *š*/ *mā gālanš* ‘they f. didn’t say
/*mā* + *tištayn* + *š*/ *mā tištanš* ‘you f.pl. don’t want’
/*mā* + *antayn* + *š*/ *mantanš* ‘you f.pl. are not’

In a restricted number of particles of the structure CayC, the diphthong is simplified to [a] in rapid speech, and the particle is reduced to the status of a clitic. In (54), the diphthong in the question particles *ayn* ‘where’ and *kayf* ‘how’ is simplified to [a], and the question word cliticized to the following consonant-initial word.

(54) /*ayn* + *gadak*/ *an gadak* ‘where are you m.s.?’
/*w-ayn* + ^{c}*ādak*/ *wan* ^{c}*ādak* ‘and where are you m.s. still?’
/*ṣalā* + *ayn* + *sārat*/ *ṣalan sārat* ‘where did she go?’
/*kayf* + *kān*/ *kaf kān* ‘how was it m.?’

In the same way, the diphthong of the verbal feminine plural subject suffix is often simplified to [a] in prosodically minimal linking verbs. The resulting subminimal structure is cliticized to a following verb, as in (55).

(55) /*jayn* + *nitwālah*/ *jan nitwālah* ‘come f.pl., let’s have fun!’
/*jayn* + *yijlisayn*/ *jan yijlisayn* ‘they f. came to sit’

Closed diphthong-shortening in San’ani is represented in (56).

(56)
σ σ σ
μ μ μ μ μ
j a y ⟨*n*⟩ *l a h a*

Output: *janlahā* ‘they f. came to her’

In contrast to Cairene, CSS and diphthong shortening fail to apply in San'ani between verbs and object suffixes or between nouns and possessive suffixes. At this level, when the object or possessive suffix has initial /h/ or /n/ there are two options: either the once domain-final C′ in CVVC′ induces epenthesis to produce a CVVC**v**C(V) sequence; or, and more commonly, C′ fails to induce epenthesis and a phonological-word-internal CVVC syllable is attested.[13] Compare the paired examples given in (57).

(57)

Epenthesis	*CVVC′ + C*	*Gloss*
kitābanā	*kitābnā*	'our book'
niswānuhum	*niswānhum*	'their m. women'
yizūrahā	*yizūrhā*	'he visits her'
baynuhum	*baynhum*	'among them m.'
zawjahā	*zawjhā*	'her husband'

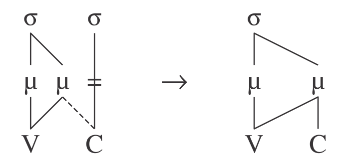
Where the object or possessive suffix has an initial consonant which is neither /h/ or /n/ (i.e. /k/), however, C′ almost always induces epenthesis:

(58)

Epenthesis	*CVVC′ + C*	*Gloss*
baytukum	*baytkum*	'your m.pl. house'
aṣwātakin	*aṣwātkin*	'your f.pl. voices'

As in the case of domain-final CVCCC syllables discussed in Section 4.3. we could claim that syllables are normally maximally bimoraic, but that trimoraic CVVC syllables are optional in restricted circumstances. Part of the answer lies in a prosodic difference between CVCC and CVVC syllables which will be discussed in more detail in the next chapter (Section 5.4.1). Here I follow Broselow (1992) and Broselow *et al.* (1995, 1997) in assuming that surface word-internal CVVC syllables in dialects including Iraqi, Sudanese, and Lebanese (Aoun 1979: 145) are in fact bimoraic and are derived from an adjunction rule that creates moras dominating two segments (Broselow 1992: 14–15):

(59) *Adjunction-to-Mora*



Adjunction-to-Mora occurs optionally in San'ani to produce CVVC syllables for reasons relating to sonority since 'subsyllabic constituents whose elements are widely separated on the sonority scale are less marked than constituents with closer sonority distance' (Broselow 1992: 15); therefore, while a syllable-final mora may dominate two constituents, VC, exceptionally because of the greater sonor-

[13] Recall, also, the optional occurrence of utterance-final CVVCC syllables, for example, *mā kānš* as an alternant for *mā kanš* 'he was not' discussed above.

ity distance between V and C, it is unlikely that a single mora could dominate two identical constituents CC (or, indeed, VV). Adjunction-to-Mora thus accounts for the marked occurrence of word-internal CVVC syllables beside the non-occurrence of word-internal CVCC (or CVVV) syllables.[14] Where a language existed which allowed Adjunction-to-Mora to create a CC mora, we predict that it would also permit Adjunction to create the less marked VC mora (Broselow 1992: 15).

4.4.2 *Syncope*

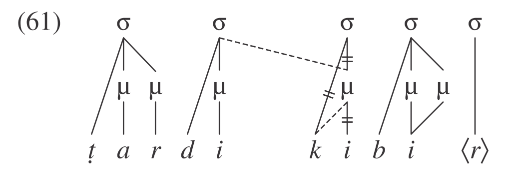
Syncope is not strictly required as a repair process, but is usually invoked to reduce the number of monomoraic syllables in the utterance and maximize the number of optimal bimoraic syllables. In both Cairene and San'ani, syncope of short vowels occurs, but in Cairene the vowel affected is almost invariably high, /i/ or /u/,[15] and syncope is blocked if the resulting structure would create an impermissible syllable (Broselow 1992). In San'ani, by contrast, any of the short vowels /a/, /i/, or /u/ may be subject to syncope, syncope is not limited to vowels in monomoraic syllables particularly in post-pause position, and the output of syncope frequently produces structure-violating initial consonant clusters.

4.4.2.1 *Syncope in Cairene*

In Cairene, syncope of unstressed, high vowels in non-final monomoraic syllables occurs within the utterance whenever the output does not violate structure preservation. That is to say, /i/ is deleted from a monomoraic syllable if and only if flanked by vowel-final syllables—namely, CV(V)CiCV(V). Thus, /i/ in *risāla* 'letter' and *kibīr* 'big' is subject to syncope after *li* and . . . *di* in the following phrases, and the mora of the syncopated vowel is assigned to the /r/ of *r*(*i*)*sāla* 'letter' and the /k/ of *k*(*i*)*bīr* 'big', respectively, as in (60).

(60) *kān yiktib li rsāla* 'he was writing me a letter'
ṭardi kbīr 'my parcel is big'

The form *ṭardi kbīr* 'my parcel is big' is derived from /*ṭardi kibīr*/, as in (61).

(61)


However, /i/ in *risāla* is not subject to syncope after *yiktib* 'he writes' because this would create an impermissible initial consonant cluster, *rs*—see (62).

[14] The few lexicalized examples of CVVC syllables in Cairene in loans from Standard Arabic of the form CVVG such as *mudīr ᶜāmm* 'general manager' and *ʔalam gāff* 'a dry pen' are also analysed as Adjunction-to-Mora.

[15] By contrast, except in the environment CVVCaCV (67), /a/ remains stable and is not subject to syncope (Fischer 1969: 67), as in: *ṭardi ṭawīl* 'a long parcel' and *inta katabt* 'you m.s. wrote'.

(62) *kān yiktib risāla* 'he was writing a letter'

In the same way, syncope of /i/ in *kibīr* does not occur after *ḥagar* 'stone', because the syllable to its left is consonant final and syncope would result in an impermissible initial consonant cluster, *kb*:

(63) *ḥagar kibīr* 'a big stone'

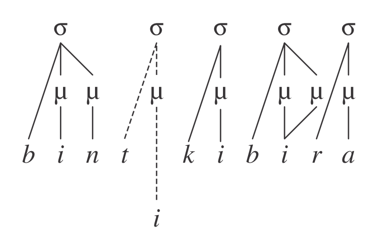
Syncope is sensitive to stress factors and fails to target stressed high vowels: while unstressed /i/ in *ši*ribt* is syncopated after a vowel-final word, stressed /i/ is not syncopated in **širib* in the same environment. Syncope in *ana š*ribt* 'I drank' contrasts with lack of syncope in *huwwa *širib* 'he drank' (Broselow 1976: 4).

Syncope often occurs after, and in consequence of, epenthesis, as in (64).

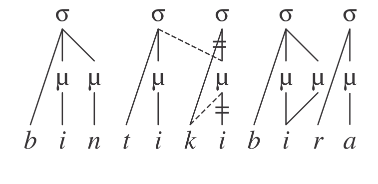
(64)	/*bint + kibīra*/	*bint*[*i*] *kbīra*	'a big girl'
	/*ḥubb + kitīr*/	*ḥubb*[*i*] *ktīr*	'a lot of love'
	/*bint + wi-walad*/	*bint*[*i*] *w-walad*	'a girl and a boy'

The interaction of epenthesis and syncope is illustrated in the derivation of *binti kbīra* 'a big girl' in (65).

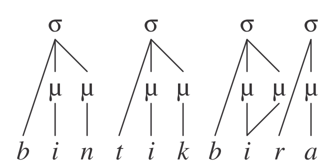
(65) (a) Epenthesis



(b) Syncope



(c) Output



Syncope also occurs within the phonological word when vowel-initial suffixes are added:

(66)	/*wiḥiš + a*/	*wiḥša*	'bad f.'
	/*xuluṣ + it*/	*xulṣit*	'she finished'
	/*māsik + a*/	*maska*	'taking hold f.'
	/*rāgil + ēn*/	*raglēn*	'two men'
	/*sāfir + u*/	*safru*	'they travelled'

Syncope is not entirely restricted to high vowels in Cairene. In the environment CVVCaCV, /a/ is subject to syncope and the long vowel shortens (Woidich 1999:

48). Form III verbal nouns of the pattern mVCaaCaCa in Standard Arabic and other dialects are realized as mVCaCCa in Cairene via the same process (see Section 6.5.7.4):

(67)	/*miṭēwal + a*/	*miṭiwla*	'elongated f.'
	/*yisōraʔ + u*/	*yisurʔu*	'they became unconscious'
	/*rāxar + a*/	*raxra*	'other f.'
	/*bani ʔādam + īn*/	*bani ʔadmīn*	'people'
	/*miᶜātaba*/	*miᶜatba*	'reproach, rebuke'

Broselow (1992) argues that the strong preference of dialects for bimoraic syllables underlies a number of phonological processes in Arabic, including syncope. The preference for bimoraic syllables is expressed in terms of the Bimoraicity Constraint.

(68) *Bimoraicity Constraint*
Syllables are maximally and optimally bimoraic (Broselow 1992: 10).

Broselow assumes that syncope applies blindly in all Arabic dialect types to destroy vulnerable monomoraic syllables (Broselow 1992: 35), and that structure is then restored where necessary by 'structure-restoring' epenthesis (Broselow 1992: 36–7). This appears to be the correct analysis for Cairene and the other dialects Broselow examines (Iraqi, Sudanese, Makkan, and Syrian), but it cannot account for dialects in which syncope is partially lexical, where syncope is optional and restricted to a certain portion of the phonological word, and where syncope applies within unstressed bimoraic syllables as well as in monomoraic syllables—this is what we find in San'ani.

4.4.2.2 *Syncope in San'ani*

In San'ani, as in Cairene, syncope targets vowels in monomoraic syllables which are flanked by vowel-final syllables across words to reduce the number of syllables and maximize bimoraicity (cf. Section 4.4.2.1). In contrast to Cairene, however, any of the short vowels may be syncopated, as in the examples in (69).

(69)	/*tištī + tisīr*/	*tišti tsīr*	'she wants to go'
	/*gadū + kubur*/	*gadu kbur*	'he has grown up'
	/*ᶜādī + rajamat*/	*ᶜādi rjamat*	'she has just thrown'

Syncope also affects monomoraic syllables within the clitic group when vowel-final proclitics are affixed:

(70)	/*ᶜa + yisāfir*/	*ᶜa-ysāfir*	'he will travel'
	ᶜa + tikūn/	*ᶜa-tkūn*	'she will be'
	/*bi + nigarrī*/	*bi-ngarrī*	'we teach'
	/*mā + rajamathā + š*/	*ma rjamathāš*	'she didn't throw it f.'

However, syncope in San'ani not only reduces the number of monomoraic syllables to maximize bimoraicity, it also targets vowels at the beginning of the

phonological word to produce apparently structure-violating clusters of up to three consonants in syllable-onset position. Moreover, syncope in San'ani does not tend to target unstressed vowels at the end of the phonological word.

In contrast to Cairene, word stress in San'ani is subject to significant fluctuation in connected speech (see Section 5.4.4). Disyllabic words of the structure CVC-CVC and CVCVC and form VII and VIII verbs (of the structure (CV)CCVCVC) are regularly affected by stress fluctuation, with the final CVC syllable frequently attracting stress in utterance-final position. The words in (71) can be stressed on either the leftmost or the following syllable, with optional syncope of the vowel of the leftmost syllable when the following syllable is stressed.

(71)	*Leftmost*	*Following*	*Gloss*
	šikmih	*škmih*	'lunch party for parturient'
	fitših	*ftših*	'unveiling'
	marih	*mrih*	'woman'
	xašab	*xšab*	'wood'
	ḥaṭab	*ḥṭab*	'wood'
	hiribat	*hribat*	'she fled'

In the following words, the first syllable is never stressed, and the word may be pronounced as alternative (a) or (b):

(72)	(a)		(b)		
		fihimtī		*fhimtī*	'you f.s. understood'
		katabt		*ktabt*	'I wrote'
		hiribt		*hribt*	'I fled'
		jilist		*jlist*	'I stayed'
		kabīr		*kbīr*	'big, old m.s.'
		sitārih		*stārih*	'[woman's coloured cloak]'
		muġanniyāt		*mġanniyāt*	'singers f.'
		yinaggišūhā		*ynaggišūhā*	'they tattoo her'

In addition, lexical syncope takes place optionally in plural and second feminine singular inflections of medial geminate (form II) verbs (see Section 6.5). Syncope is accompanied by degemination of the medial consonant—see (73).[16]

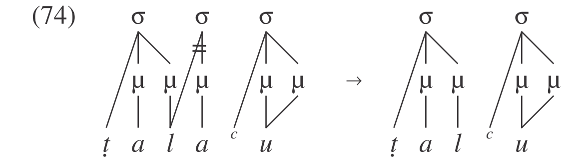
(73)		*With syncope/ degemination*	
	ṭalla^{c}*ū*	*ṭal*^{c}*ū*	'they m. took up'
	ragga^{c}*ū*	*rag*^{c}*ū*	'they m. sewed'
	yiwaṣṣulū	*yiwaṣlū*	'they m. make (someone) arrive'
	yilabbisū	*yilabsū*	'they m. dress (someone)'
	yijamma^{c}*ayn*	*yijam*^{c}*ayn*	'they f. collect'

[16] Recall that within the phonological word and in phonological-word-final position, geminates are maintained in San'ani, and usually induce epenthesis, as in: */kull + nā/* > *kullanā* 'all of us', */ḥagg + šayx/* > *ḥagg*[*a*] *šayx* 'belonging to a shaykh'.

yikammilayn	*yikamlayn*	'they f. complete'
tiḏakkirī	*tiḏakrī*	'you f.s. recall, remember'

Syncope in medial geminate verbs is represented notionally as deletion of the node of the penultimate monomoraic syllable when the onset of that syllable shares the same consonant as the mora of the preceding syllable. The form *ṭal*^{c}*ū* 'they m. took (something) up' is derived as in (74).

(74)



In fast speech, when the first consonant of the verbal stem is a sibilant, syncope often targets the vowel of the following bimoraic syllable; therefore syncope is not restricted to the final syllable of the stem; compare (75).

(75)

	With syncope/degemination	
yišakkimū	*yiškmū*	'they m. lunch the parturient'
yišaffiṭū	*yišfṭū*	'they m. make *šfūṭ*'

If syncope were to apply blindly in San'ani to maximize bimoraicity it would not be possible to predict where 'structure-restoring' epenthesis would occur, particularly since syncope is not restricted to vowels in monomoraic syllables (see *šikmih* > *škmih*, *yišakkimū* > *yiškmū*, and *tištay* > *tštay* above).

4.4.2.3 *Consonant clusters and the Sonority Sequencing Principle*

According to the Sonority Sequencing Principle (SSP), the sonority profile of preferred syllable types rises maximally at the beginning and drops minimally at the end. Initial consonant clusters resulting from syncope in San'ani can be divided into those which obey the Sonority Sequencing Principle: Occlusive < Fricative < Nasal < Liquid < Glide (Clements 1990: 290), and those which flout it, as in (76):

(76)

Sonority	Obey	Flout	Sonority
O < Gl	*s.t*^{c}*āš*	*nxaz.zin*	N > Fr
O < L	*trāb*	*mġan.ni.yāt*	
	drīt	*n.xrij*	
O < Fr	*tsa*^{c}	*msaj.ji.lāt*	
Fr < N	*zmur*	*ynag.gi.šū.hā*	Gl > N
Fr < L	*ḏ̣rubnī*	*ftī.lih*	Fr > O
		skub	
		stā.rih	
		xšab	Fr = Fr
		šfūṭ	
		fhim.tī	

šhir
zġīr
yir.tkiz O = O
bi-n.tkīʔ

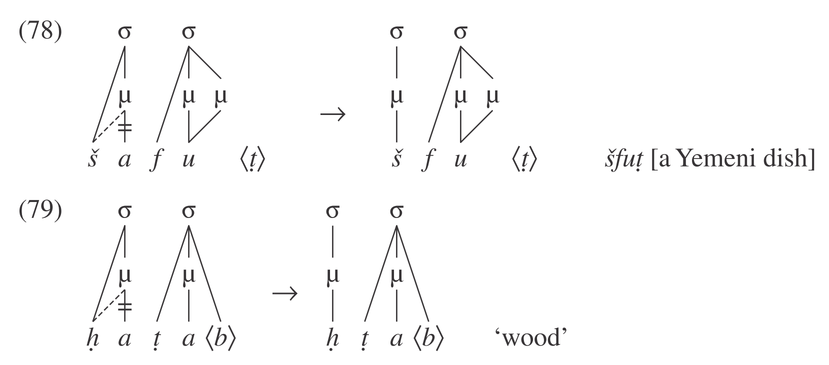
Sequences which flout the SSP in San'ani include sonority 'plateaus' Fr = Fr, and O = O, and sonority 'reversals' N > Fr, and L > N. Sequences which flout the SSP result partially from the type of initial consonants available in the derivational and inflectional morphology. Nasal /m/ to derive participles from verbs, and glide /y/, nasal /n/ and occlusive /t/ in the verbal inflectional morphology, and partially from the prevalence of coronal consonants (/y, n, s, š, t, z/) in the phonology, thus increasing the likelihood of initial coronals in consonant clusters (cf. Clements 1990; cf. Yip 1991[17]).

In a sample of five hours and thirty minutes of unrehearsed personal narrative and descriptive recordings from a single speaker of San'ani, I came across 120 instances of syllable-initial consonant clusters resulting from syncope. Within these, I found the hierarchy of preference in initial clusters given in (77). In the left-hand column, I have recorded the order of consonant types; in the middle column, the number of occurrences of the cluster type; in the right-hand column I have written the abbreviations So (obey sonority hierarchy), R (sonority reversal), and P (sonority plateau).

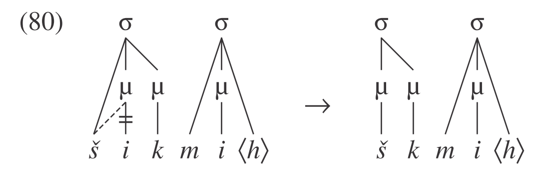
(77)	1.	Fr–O	21 [of which Fr = sibilant in 16 instances]	R
	2.	N–Fr	15	R
	3.	Fr–L	13	So
		Fr–Fr	14 [one Fr = sibilant in 13 instances]	P
	5.	O–Fr	11	So
	6.	O–L	9	So
		O–Gl	10	So
	8.	N–Gl	8	So
	9.	O–O	5 [all tokens involve combinations /t/ and /k/]	P
	10.	N–O	3	R
	11.	Fr–N	2	So
		Fr–Gl	2	So
		Gl–O	2	R
		F–Gl	2	So
	15.	O–N	1	So
		L–Fr	1	R
		G–Fr	1	R

[17] According to Yip (1991), consonant clusters may have at most one place of articulation. This explains the special status of geminate consonants and the high number of cases of clusters involving at least one coronal or laryngeal, since coronal and laryngeal consonants lack a place of articulation node in Yip's underspecification model. The majority of San'ani consonant clusters noted in this study have at least one coronal consonant.

Within this collection, I did not include all instances of tokens when tokens were repeated successively, as in *štī* in: *štī gāl štī* ‘I want, he said, I want’. The majority of repeated tokens were instances of Fr–O combinations. In word-list readings, I would expect a higher number of Glide + Occlusive/Nasal/Liquid combinations since /y/ is the prefix consonant for third person pronouns in the imperfect verb (e.g. *ygūl* ‘he says’, *ysāfir* ‘he travels’, *yḏ̣rub* ‘he hits’). Interestingly, the highest proportion of consonant clusters resulting from syncope involve sonority ‘reversals’ and ‘plateaus’.[18] The two most commonly attested combinations are sonority ‘reversals’ which account for 30 per cent of the total consonant clusters. Of the ‘reversals’ and ‘plateaus’, a high number involve initial or, less commonly, medial sibilant S[19] (16 out of 21 Fr–O combinations involve initial S, and 13 out of 14 Fr–Fr combinations have S as one of the two fricatives). Where syncope results in a sonority ‘reversal’ or ‘plateau’, I assume that the moraic content of the syncopated vowel is not lost and that the initial consonant associates with the disassociated mora. Syncope is represented notationally in (78) and (79).



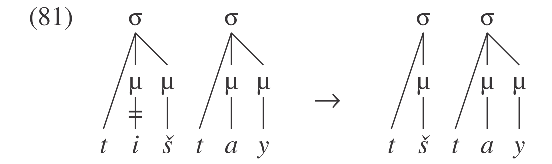
Where syncope deletes the vowel in a CVC bimoraic syllable, the ‘coda’ consonant retains its mora and serves as the coda to a syllabic consonant if and only if the initial consonant of the original CVC syllable is more sonorous than the final consonant, as in the derivation of *škmih* ‘lunch party for parturient’ in (80).



[18] Wherever sonority plateaus are involved in syllable-initial consonant clusters, the distance between the respective places of articulation of the two segments is crucial: in no instances of sonority plateaus in the San’ani data are identical places of articulation attested. Instances of O–O involve combinations of /t/ + /k/ (usually in that order). To this can be added less common, but permissible, combinations: /b/ + /t/, /b/ + /d/, /b/ + /g/.

[19] ‘Clusters of S + stops are a well-known pattern in the world’s languages in the sense that these segments typically cluster together even if a language does not have the Obstruent Sequencing Principle’ (Rubach 1993: 218).

When the final ('coda') consonant of a syncopated CVC syllable has greater sonority than the initial consonant, however, the initial mora is lost after dissociation from the vowel, while the 'coda' consonant of that syllable retains its mora and functions as the syllable peak of the initial syllable, as illustrated in the derivation of *tštay*[20] 'you f.s. want' in (81).

(81)


4.5 CONCLUSION

In this chapter I have considered syllable structure and syllabification in Cairene and San'ani. Within the discussion, I established the basic syllable inventory for each dialect. I considered the analysis of phonological-word-final CVCCC syllables in San'ani, and then discussed syllabification in the dialects. I considered three syllable repair processes—epenthesis, glottal stop prosthesis, and closed syllable shortening. In the final section, I considered syncope in the two dialects. The issue of possible trimoraic syllables arose twice in the discussion: in the analysis of CVCCC syllables in San'ani, and in the discussion of word-internal CVVC syllables in the same dialect. For both CVCCC syllables and word-internal CVVC syllables, an analysis of bimoraicity was proposed: in the first case it was demonstrated that CVCCC syllables are avoided wherever possible, that they are restricted to phonological-word-final position, and that they occur only when the verbal suffixes {first person singular} or {second person masculine singular} and {negative} are concatenated. A bimoraic account of CVCCC syllables is possible by analysing final *tš* (derived from morpheme concatenation) as a surface affricate which is extrasyllabic in domain-final position. In the case of internal CVVC syllables, it was argued that CVVC syllables are a marked option, and usually occur only when the following object or possessive pronoun suffix begins with either /h/ or /n/. I concluded that CVVC syllables can be analysed as bimoraic and not as trimoraic on the basis of VC sharing a mora through Adjunction-to-Mora, as proposed by Broselow (1992) and Broselow *et al.* (1995, 1997) for other eastern dialects of Arabic.

In the discussion on syncope, I suggested that Broselow's assumption that syncope applies blindly in Arabic dialects to destroy vulnerable monomoraic syllables cannot fully account for dialects like San'ani in which syncope applies optionally

[20] In contrast to domain-final *tš* in CVCCC syllables considered in Section 4.3, *tš* is not analysed as an affricate in the case of *tštay* 'you f.s. want'. This is because /š/ has been independently assigned a mora through Weight-by-Position prior to the application of syncope. It retains its mora and functions as the syllable peak of a vowelless syllable owing to its relative high sonority.

at the beginning but not at the end of the phonological word, is partially lexical, and deletes vowels in bimoraic as well as in monomoraic syllables. Furthermore, I show that—as a result of stress fluctuation—syncope produces initial consonant clusters, a large percentage of which flout the Sonority Sequencing Principle. In the majority of these cases, the mora of the syncopated syllable is retained and re-associates with the relatively sonorous initial consonant. When the vowel of an originally bimoraic (CVC) syllable is subject to syncope, the rightmost C of the syllable retains its mora (assigned through Weight-by-Position), while the leftmost C associates with the mora of the syncoped vowel if and only if the leftmost C has greater sonority than the rightmost C. When the leftmost C of the original CVC syllable has less sonority than the rightmost C, the disassociated mora is lost and the final moraic C functions as the syllable peak of an initial syllable.

5

WORD STRESS

Arabic is a language with word stress.[1] This means that one of the syllables in a content word is perceived as prominent and receives main stress. In words of more than two syllables in San'ani (optionally also in words of two syllables where the leftmost syllable is heavy and the rightmost syllable superheavy) one or more of the remaining syllables receives secondary stress. In Cairene, secondary stress is not perceived.

This chapter discusses the word-stress systems of Cairene and San'ani. In Section 5.1 I consider the basic stress rules for each dialect. In Section 5.2 I introduce the theoretical model assumed to analyse stress in the dialects. Within this section I consider the size of the minimal word in the dialects and the concept of degenerate feet. I then discuss the role of extrametricality and extrasyllabicity. In Section 5.3 I present an analysis of word-stress assignment in Cairene. In Section 5.4 I present an analysis of word-stress assignment in San'ani. To account for differences between the stress systems of Cairene and San'ani, I look at the role of foot extrametricality, and the prosodic treatment of types of bimoraic syllables in San'ani. Other issues addressed in this chapter include stress fluctuation and secondary stress in San'ani.

5.1 WORD-STRESS PATTERNS

5.1.1 *Word-stress patterns in Cairene*

Word-stress patterns in Cairene have received a great deal of attention in recent years and have played a central role in the development of metrical theory. Syllables in Cairene fall into three categories: light CV, heavy CVC and CVV, and superheavy CVCC and CVVC (see Section 4.2). Superheavy syllables are restricted to domain-final position, with the exception of a few lexicalized instances of word-internal CVVC syllables (see Section 4.3). The basic word-stress pattern, discovered by Mitchell 1960, is stated below (following Hayes 1995 and McCarthy 1979*b*). In my description of Cairene stress, I do not consider the pronunciation of Standard Arabic by Cairene speakers, in contrast to Mitchell, McCarthy, Hayes, and others. In the examples that follow, ' denotes a following stressed syllable.

[1] Although the classical Arab grammarians do not mention word stress, it is generally accepted that Classical Arabic had it. Proto-Semitic probably had free stress, however (Hetzron 1992: 413).

(1) *Cairene stress algorithm*

(a) Stress a final superheavy or CVV syllable:

kaˈtabt ‘I wrote’
falaˈḥīn ‘peasants’
kiˈtāb ‘book’
ᶜafˈrīt ‘devil’
gaˈtō ‘cake’
raˈmū ‘they threw it m.’

(b) Otherwise stress a penultimate heavy (CVC or CVV) syllable:

ˈbētak ‘your m.s. house’
ˈbintik ‘your f.s. daughter’
darˈrasni ‘he taught me’
muˈdarris ‘teacher’
yikalˈlimhum ‘he speaks to them’

(c) Otherwise stress the penultimate or antepenultimate syllable, whichever is separated by an even number of syllables from the closest preceding heavy syllable (A), or—if there is no such syllable—from the beginning of the word (B):

i. Penultimate stress

(A) *mudarˈrisa* ‘teacher f.’
madˈrasa ‘school’
(B) *ˈfihim* ‘he understood’
kataˈbitu ‘she wrote it m.’
ḍaraˈbitu ‘she hit him’

ii. Antepenultimate stress

(A) *inˈkasarit* ‘it f. was broken’
yixˈtalifu ‘they differ’
(B) *ˈdarasit* ‘she learnt’
ˈᶜarabi ‘Arabic’
ˈkataba ‘scribes’

Two well-documented exceptions to (1cii) are that stress is always assigned to the penultimate syllable in the {third person feminine singular} inflectional form of the perfect verb with a V(C) object suffix (2a) (Abdel-Massih 1975: 26), and in a plural with the template CiCiCa or CuCuCa (2b) (Broselow 1976: 13–14):

(2) (a) *raˈmitu* ‘she threw it m.’
šaˈlitu ‘she took it m.’
šaˈfitak ‘she saw you m.s.’
(b) *liˈbisa* ‘underpants’
ġiˈriba ‘crows’
suˈbuᶜa ‘lions’
tuˈkusa ‘taxis’

5.1.2 *Word-stress patterns in San'ani*

San'ani has a stress system superficially very similar to several other eastern dialects of Arabic, including what we take to have held for Classical Arabic.[2] A typical peninsula Arabic stress system has the algorithm in (3).

(3) (a) Stress a final superheavy (CVCC or CVVC) syllable.
(b) Otherwise stress the rightmost non-final heavy syllable (up to the antepenultimate).
(c) Otherwise stress the leftmost light syllable.

This holds for stress assignment in most types of words in San'ani.

(4)	(a)	*makˈtūb*	'letter'
		daˈrast	'I/you m.s. learnt'
		gamˈbart	'I/you m.s. sat'
	(b)	*ˈmadrasih*	'school'
		ˈtafruṭuh	'women's party'
		ˈsāfarat	'she travelled'
		zuˈmurjad	'emerald'
		miˈgambar	'sitting'
		maˈkātib	'offices', 'libraries'
		miġˈsālih	'launderette'
		kaˈtabnā	'we wrote'
	(c)	*ˈkatab*	'he wrote'
		ˈlibisat	'she wore', 'put on'
		makˈtabatī	'my library'

However, part (a) of the algorithm—assignment of stress to a final superheavy syllable—fails to apply when the penultimate or antepenultimate syllable is CVV or ends in the left leg of a geminate consonant. Consider the following examples:

(5)	*ˈṣābūn*	'soap'
	maˈkātīb	'letters'
	ˈxuṭṭāf	'clasp'
	muˈdarrisīn	'teachers m.'
	ˈxārijīn	'going out m.pl.'
	ˈsāfart	'I/you m.s. travelled'
	ˈdarrast	'I/you m.s. taught'

[2] McCarthy (1979*b*) describes Classical Arabic as having unbounded feet (repeated in Hayes 1979: 80, 1995: 296). However, scholars do not totally agree on the stress system of Classical Arabic. Wright claims the 'accent is thrown back as far as possible' in words lacking a penultimate or antepenultimate heavy syllable, e.g. *ˈmasʔalatuhā* 'her problem' (Wright 1971: 27–8). There is some evidence that Classical Arabic had bounded (binary) feet and that stress did not go further left than the antepenultimate syllable (Angoujard 1990: 282–5; Versteegh 1997: 90).

In the examples in (5), the rightmost non-final CVV or CVG syllable of the word is stressed. This stress pattern compares to that of dialects such as Sudanese and Cairene in which final superheavy syllables are invariably stressed, irrespective of the weight of adjacent syllables:

(6)

Sudanese		*Cairene*	
masāˈkīn	'poor pl.'	*masaˈkīn*	'poor pl.'
kiˈtāb	'book'	*kiˈtāb*	'book'
mudarriˈsīn	'teachers m.'	*mudarriˈsīn*	'teachers m.'
sāˈfart	'I/you m.s. travelled'	*darˈrast*	'I/you m.s. taught'

In addition, while the rightmost non-final CVC syllable is stressed unless it falls in pre-antepenultimate position, as in *ˈmaklaf* 'woman', *ˈmadrasih* 'school', *ˈmaktabih* 'library' but *makˈtabatī* 'my library', the rightmost CVV or CVG syllable is stressed even when it falls in pre-antepenultimate position, as in:

(7) *muˈsajjilatī* 'my recorder'
ˈhākaḏahā 'like this'

The stress algorithm in (3) is revised for San'ani to take account of the behaviour of final CVVC/CVCC and non-final CVV and CVG syllables.

(8) *San'ani stress algorithm*

(a) Stress the rightmost non-final CVV or CVG syllable.
Examples: *maˈkātib* 'offices', *aˈsāmī* 'names', *baˈsātīn* 'gardens', *ˈṣābūn* 'soap', *ˈxārijīn* 'going out m.pl.', *ˈdāriyāt* 'knowing f.pl.', *mitˈʔaxxirāt* 'late f.pl.', *yiˈḥibbū* 'they m. love, like', *muˈsajjilatī* 'my recorder', *ˈhākaḏahā* 'like this', *ˈsāfart* 'I/you m.s. travelled', *ˈdawwart* 'I/you m.s. looked for'.

(b) Otherwise stress a final CVVC/CVCC syllable.
Examples: *daˈrast* 'I/you m.s. learnt', *ʔabˈsart* 'I/you m.s. saw', *gamˈbart* 'I/you m.s. sat', *lafˈlaft* 'I/you m.s. collected', *dišˈmān* 'rebel; poor m.s.', *baˈnāt* 'girls'.

(c) Otherwise stress the rightmost non-final CVC syllable up to the antepenultimate.
Examples: *ˈlaflaf* 'he collected', *ˈmaklaf* 'woman', *ˈmadrasih* 'school', *ˈmaklafih* 'his woman'

(d) Otherwise stress the leftmost CV syllable.
Examples: *ˈkatab* 'he wrote', *ˈdarasat* 'she learnt', *ˈragabatih* 'his neck', *makˈtabatī* 'my library'.

(e) Stress final CVV in disyllabic adjectives or di- or trisyllabic verbs in the imperfect.
Examples: *yifˁaˈlū* 'they m. do', *ṭaˈrī* 'fresh'.

In contrast to many other eastern dialects of Arabic, San'ani also exhibits contextually fluctuating stress (Rossi 1939: 8; Goitein 1970: xvii; Diem 1973; Naïm-Sanbar 1994). Rossi claims that 'The position of the stress depends on the emphasis of

the utterance, on the position of the word within the sentence, and on the emphasis laid on the word' (Rossi 1939: 8, translated in Rabin 1951: 103–4). In connected speech, stress fluctuates regularly when used for expressive accent or for emphasis, in pre- and post-pause position, when the word is the second term in a genitive phrase, and after the definite article (Naïm-Sanbar 1994).

When a word is repeated, it usually receives different stress in each of the two instances for expression or contrast. This is particularly the case when the word has the pattern CVC.CVC or CVV.CVC. In accordance with a rhythmic principle, the first word is stressed on the initial syllable and the following word on the final syllable, as in (9).

(9) *ˈwāḥid wāˈḥid* 'one by one'
wa-yifᶜalū ˈḥaflih ḥafˈlih 'they have lots of parties'

When a verb takes a consonant-initial object suffix, the initial syllable of a verb with a CVCVC template may be stressed to emphasize the action of the verb:

(10) *gad ˈḏ̣arabhā* 'he did hit her/he *hit* her'
versus
gad ḏ̣aˈrabhā 'he hit her'

In post-pause position, there is a tendency for the first syllable of the word to be stressed, irrespective of its weight or the weight of the following syllable(s):

(11) (a) Bisyllables: *ˈgaᶜād*, *ˈtamām*, *ˈṯalāṯ*, *ˈʔusbūᶜ*, *ˈyidᶜaw*, *ˈmarih*
(b) Trisyllables: *ˈyifᶜalū*, *ˈyiḏbaḥū*, *ˈdarasū*
(c) Quadrisyllables: *ˈbaladīyāt*, *ˈyamanīyīn*

However, when the initial syllable is the imperfect marker for either form II or form V verbs, or the participle prefix *mu-~mi-* before a CVG syllable, the initial syllable is not assigned stress in any contextual position:

(12) *yiˈbanninū*, *yiˈgassimū*

As the second term of a genitive phrase or following the definite article, an initial CVC syllable or CV syllable is usually stressed irrespective of the weight of the following syllable:

(13) *yawm ˈxamīs* 'a Thursday'
yawˈm iṯnayn 'a Monday'
aš-ˈšaḏāb 'basil'

In pre-pause position, final CVC and CVV syllables are often stressed as an alternative to penultimate or antepenultimate stress. This mirrors the assignment of stress to initial syllables in post-pause position:

(14) *Final stress* *Ante/penultimate stress*

yukˈtub	*ˈyuktub*	'he writes'
kaˈtab	*ˈkatab*	'he wrote'

ma'rih	*'marih*	'woman'
yidarri'sū	*yi'darrisū*	'they m. teach'

To enhance the prominence of a final stressed CVC syllable, the vowel of this syllable may be either lengthened phonetically (cf. Hayes 1995: 100), as in (15), or the vowel of the initial destressed syllable subject to syncope, as in (16).

(15)	*/yuxlaṭ/*	*yux'la:ṭ*	'he mixes up, mistakes'
	/ᶜammī ʔaḥmad/	*ammī ʔaḥ'ma:d*	'my Uncle Ahmad'

(16)	*/ḥaṭab/*	*ḥ'ṭab*	'wood'
	/xašab/	*x'šab*	'wood'
	/marih/	*m'rih*	'woman'
	/šikmih/	*šk'mih*	'lunch party for parturient'

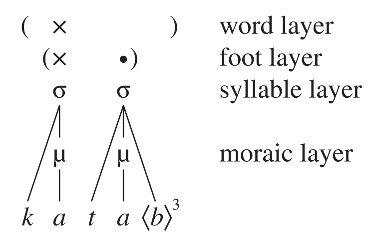
Where the prominent syllable of a word receives main sentence stress, the vowel or sonorant consonant of this syllable may also be lengthened, as in (17).

(17)	*gadī gariyih ka'bī:rih*	'it is a *big* village'
	gad jaw an-nās 'kull:uhum	'the people came, *all* of them'

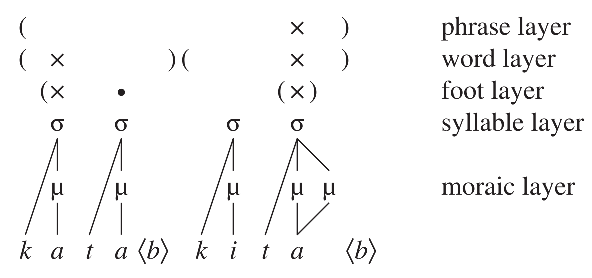
5.2 THE THEORETICAL MODEL

The theoretical model I assume is the Metrical Stress Theory of Hayes (1995). The central claim of the theory is that stress is the linguistic manifestation of rhythmic structure, and that the special phonological properties of stress can be explained on this basis (Hayes 1995: 1). Where a language has secondary stress this is determined generally by a rhythmic principle which creates an alternation of stressed and unstressed syllables. The theory has six main aspects which are summarized in (18) (Hayes 1995: 2–3).

(18) (a) Metrical structure is represented by the bracketed grid, which is a hierarchy of rhythmic beats grouped into a hierarchy of constituents. Within the grids there are four layers above the segmental layer: the moraic layer, the syllable layer, the foot layer, and the word layer. In phrases, there is also a supra-word phrase layer. The grid columns are subject to the Continuous Column Constraint: if a mark is placed on the word layer for a column, that column will also have marks on the foot, syllable, and moraic layers, as in the representation of Arabic *'katab* 'he wrote' below. In this and following bracketed grids, the stressed element of a foot/word is represented by × and the non-stressed element of the foot by a bullet •.



Similarly, where a constituent of a word receives main phrasal or sentence stress, that constituent will also have a continuous column of marks on each of the word, foot, syllable, and moraic layers. This is exemplified in the representation of *katab kitāb* 'he wrote a book' where the final syllable of *kitāb* receives both word and phrase stress:



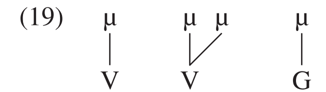
(b) The smallest metrical unit is the foot. A language may either have unbounded feet where the parameters of the metrical foot will be the entire phonological word, or bounded feet. There are three common bounded foot types: the moraic trochee, the syllabic trochee, and the iamb. Cairene and San'ani Arabic both have moraic trochee systems.
(c) The basis of the foot inventory is a principle called the Iambic/Trochaic Law, which forms part of the theory of rhythm, not of language proper. This law determines the set of possible feet and motivates a large number of segmental rules that adjust metrical structure.
(d) Metrical structure creation is non-exhaustive. This means that it need not exhaust the string of syllables in the word, and that some syllables may be left unaccounted for by metrical structure creation.
(e) Many languages impose a ban on 'degenerate' feet—that is to say, in this case, languages that respect quantity disallow feet consisting of just one mora, and languages that do not respect quantity disallow feet consisting of just one syllable.
(f) Syllable weight is not a unitary phenomenon; rather, languages distinguish between syllable quantity and syllable prominence. Quantity is represented by mora count, while prominence may be based on a number of other properties of the syllable, and is represented formally

[3] The treatment of domain-final consonants is discussed in Section 5.2.4.

with grid columns of varying height. Quantity may be referred to by rules of foot construction while prominence may be referred to by other metrical rule types, as in end rules and destressing.

5.2.1 *The moraic model*

The moraic model assumed is one in which short vowels are assigned one mora, long vowels two moras, and geminate consonants one mora underlyingly (see Section 4.1; Hayes 1989).

(19)


In languages in which (C)VC syllables count as heavy, non-geminate consonants in the rhyme are assigned a mora at a later stage by the Weight-by-Position condition (see Section 4.1 and Hayes 1989, 1995: 52):

(20)
```
μ            μ  μ
|      →     |  ⋮
V  C         V  C
```

5.2.2 *The iambic/trochaic division*

Languages with bounded metrical feet have either iambic or trochaic feet. Iambic feet are formed from two elements which contrast in length, while trochaic feet are formed from two elements which contrast in intensity. This follows from the Iambic/Trochaic Law (Hayes 1995: 80) in (21).

(21) *Iambic/Trochaic law*
- (a) Elements contrasting in intensity form groupings with initial prominence;
- (b) elements contrasting in duration naturally form groupings with final prominence.

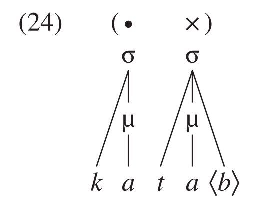
Iambs are asymmetrical binary feet with a weak followed by a strong element, while trochees consist of elements which are roughly equal in duration. Iambs can be constructed from two light syllables of which the second is stressable:

(22) de 'de, de 'de, de 'de

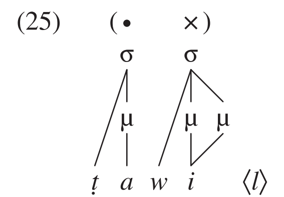
The optimum iambic foot, however, is constructed from a light syllable followed by a heavy syllable.

(23) de 'de:, de 'de:, de 'de:

Many Arabic dialects spoken in North Africa have iambic stress systems. In Cyrenaican Bedouin, *katab* ‘he wrote’ is footed as in (24) with stress assigned to the final syllable.

(24)


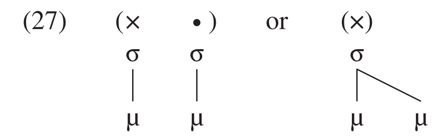
Although the majority of Arabic dialects have trochaic stress systems, much of Arabic morphology, including many singular nouns and adjectives (see Section 6.4.2), basic form I verbal nouns, and the most common broken plural patterns (see Section 6.6) and the diminutive, is based on the optimum iamb: a light syllable followed by a heavy syllable. The optimum iamb is exemplified in *ṭawīl* 'tall', attested in both Cairene and San'ani:

(25)


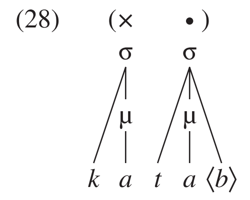
There are two types of trochaic systems: in the first type, feet are constructed from syllables, without regard for length, as in (26).

(26) (× •)
σ σ

In the second type, feet are constructed from moras. Since the moraic trochee is based entirely on moras and not on syllables, a moraic trochee may be either two consecutive light syllables or a single heavy syllable—see (27).

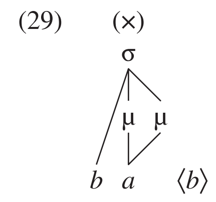
(27)


An example of a disyllabic moraic trochee from Cairene and San'ani is *katab* 'he wrote':

(28)


An example of a monosyllabic moraic trochee is *bāb* 'door', 'gate', in (29).

(29)



5.2.3 *Degenerate feet and the minimal word*

A binary foot consists of either two moras (a moraic trochee), two syllables (a syllabic trochee), or a light followed by a heavy syllable or two light syllables (an iamb). The question arises over how to deal with sub-minimal elements which are left over at the end of a string. These are a single mora (in a moraic trochee system), a single syllable (in a syllabic trochee system), or a single light syllable (in an iambic system). Sub-minimal feet which survive to the surface are described by Hayes (1995: 87) as degenerate feet. Languages differ in their treatment of degenerate feet: if a language bans degenerate feet absolutely, a sub-minimal element at the end of a footed string will simply be left unaccounted for in the parse. If, on the other hand, degenerate feet are permitted in the language, the sub-minimal element at the end of a footed string will be assigned a foot and this foot will be stressed. Most languages impose an absolute ban on degenerate feet, but some languages have a weak ban on degenerate feet and allow them in strong position. The prohibition of degenerate feet from Hayes is in (30).

(30) *Prohibition on degenerate feet*

Foot parsing may form degenerate feet under the following conditions:
(a) **strong prohibition** absolutely disallowed;
(b) **weak prohibition** allowed only in strong position, that is, when dominated by another grid mark.

The treatment of degenerate feet and the size of the minimal word in a language are closely related. This is due to a requirement that every word contain at least one foot (Hayes 1995: 47). If a language allows sub-minimal content words—that is, content words which are smaller than a proper foot—then it may allow stressable degenerate feet within larger phonological words.

In general, freestanding, stressable (non-clitic) words in Arabic are minimally bimoraic (McCarthy and Prince 1990*a*: 17–22). Examples include: *katab* 'he wrote', *bayt* 'house' (SA), *bēt* 'house' (CA), *kām* 'how much' (CA). Loan words which do not meet the minimality condition are generally modified to conform to the bimoraic requirement, as in: *bār* 'bar' (CA), *šāl* 'shawl', *ġāz* (SA) / *gāz* (CA) 'gas'. There are a few words in Arabic which are sub-minimal in their non-suffixed form but expanded in their suffixed form. These include *ab* 'father' and *ax* 'brother'. In San'ani, *-ū-* is added before all but the first person singular possessive suffix, *-ī*, so *ab* becomes *abī* 'my father', but *abūk* 'your m.s. father', *abūš* 'your f.s.

father', and *abūna* 'our father'; *ax* becomes *axī* 'my brother', but *axūk* 'your m.s. brother' and *axūna* 'our brother'. In isolation, Cairene reflexes of **ab* and **ax* are realized with doubling of the consonant as *abb* and *axx*. Once possessive pronoun suffixes are added the consonant is realized as non-geminate and, to compensate, *-ū-* is added, as in *abūya* 'my father', *abūk* 'your m.s. father', *abūna* 'our father'; similarly, *ax*(*x*) becomes *axūya* 'my brother', *axūk* 'your m.s. brother', *axūna* 'our brother'. In addition, for most modern Arabic dialects, including Cairene (Woidich and Heinen-Nasr 1995: 104) and San'ani (Watson 1996: 45), monomoraic prepositions ending in /n/ undergo *n*-gemination before pronoun suffixes (see Section 8.1.3). Consider the following examples from San'ani.

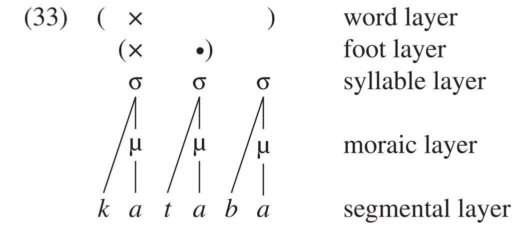
(31) /^{c}*an + ih*/ ^{c}*annih* 'about him/it m.s.'
/*min + ak*/ *minnak* 'from you m.s.'

When a possessive suffix begins with a consonant, *n*-gemination induces epenthesis. The examples in (32) are attested in both dialects:

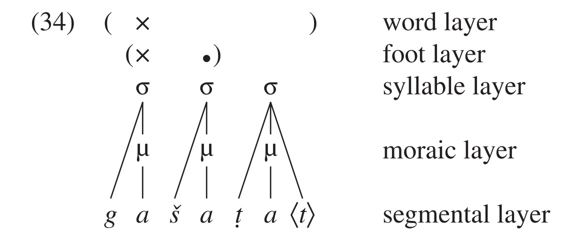
(32) /*min + hum*/ *minn*[*u*]*hum* 'from them (m.)'
/^{c}*an + kum*/ ^{c}*ann*[*u*]*kum* 'about you m.pl.'

San'ani has a few sub-minimal content words which do not conform to the minimal bimoraicity condition—in addition to *ab* and *ax* mentioned above, the words *yad* 'hand' and *dam* 'blood'. It also has a few sub-minimal non-clitic function words which contrast with comparable bimoraic words in Cairene. These include *kam* 'how many' (cf. Cairene *kām*), *bih* 'there is' (cf. Cairene *fī*), *man* 'who' (cf. Cairene *mīn*) and *ma*^{c} 'with' (cf. Cairene *ma*^{c}*a*). In Cairene, with the exception of the lexicalised sub-minimal verbs *kal* 'he ate' and *xad* 'he took' (cf. 6.5.6. pointed out by E. Broselow p.c.), sub-minimal content words are not attested; it therefore appears that degenerate feet are banned absolutely in this dialect. The treatment of degenerate feet in San'ani on the basis of the minimal word is not so clearcut, however.

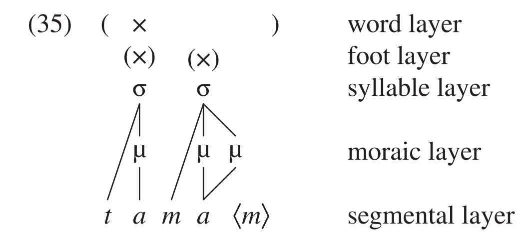
According to the claim made at the beginning of this section, an absolute ban on degenerate feet in a moraic trochee system means that a light syllable which is not footed at the beginning of a string, or which is left over at the end of a string, will remain unfooted. This prediction is borne out in Cairene. In the word *kataba* 'clerks', the foot parse proceeds from left to right to produce a left-headed foot over the syllables (*ka.ta*). The rightmost syllable (*ba*) is light, consisting of a single mora, and can therefore not support a foot. This syllable remains unfooted since Cairene bans degenerate feet absolutely, and main stress is assigned to the head of the rightmost foot, the initial syllable *ka*—see (33).

(33)


In San'ani, a final light syllable which is left over at the end of a string generally remains unfooted and will not be stressed, as exemplified in *gašaṭat* 'she shivered' in (34).

(34)


However, in post-pause position, after the first term of a genitive phrase, or after the definite article, an initial CV syllable is often stressed in disyllabic or trisyllabic words irrespective of the weight of the rightmost syllable. Thus, in post-pause position *tamām* 'okay' typically bears initial stress.

(35)


This appears to indicate that in San'ani, degenerate feet are permitted in strong position in specified prosodic environments.[4] I shall return to the discussion of degenerate feet in San'ani below when I consider stress fluctuation in the dialect.

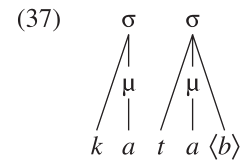
5.2.4 *Extrametricality*

Extrametricality was first invoked in metrical stress theory to deal with the fact that syllables must contain more segments to act as heavy in final position than in word-internal position (see Section 4.2). This asymmetry is dealt with by proposing that final consonants are extrametrical in a number of languages including Cairene and San'ani Arabic. Extrametricality is subject to the Peripherality Condition (Hayes 1981, 1995) in (36).

(36) *Peripherality Condition*
A constituent may be extrametrical only if it is at a designated edge (left or right) of its domain.

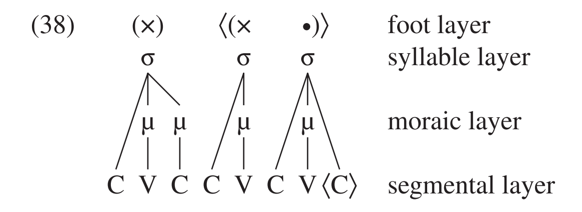
[4] As in Negev Bedouin Arabic, which has an iambic stress system and which is analysed in Hayes (on the basis of data from Blanc 1970) as imposing a weak prohibition on degenerate feet (Hayes 1995: 228).

Consonant extrametricality is illustrated by placing the peripheral consonant in angled brackets (see also Section 4.2):

(37)


The final consonant is syllabified with the rightmost syllable at a later stage in the derivation, but because of its extrametrical status it fails to be assigned a mora through the Weight-by-Position condition; thus, the syllable in which it is syllabified counts as light (monomoraic) and not as heavy (bimoraic).

Extrametricality accounts not only for cases where the final consonant is extrametrical, but also where the word layer rule selects a non-final foot for main stress. In this case, the peripheral foot is deemed to be extrametrical. There is evidence from many languages, including dialects of Arabic (for instance, Palestinian, Egyptian radio Arabic, Bani-Hassan, Sudanese, and San'ani), that the presence of an extrametrical consonant in a peripheral foot does not deprive the foot of peripherality in its own right (Hayes 1995: 105–6). This is because the extrametrical consonant is contained within the peripheral foot and does not come between the foot and the rightmost edge. In (38), the extrametrical C is peripheral on the segmental layer but contained within the extrametrical foot ⟨(× •)⟩, which is peripheral on the foot layer.

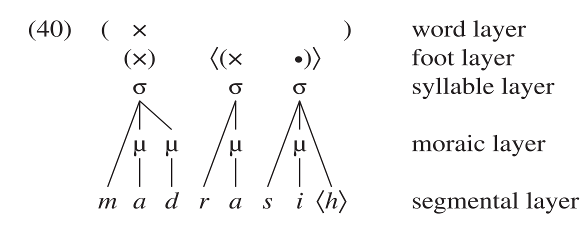
(38)


To allow higher level extrametrical constituents to contain lower level extrametrical constituents, Hayes proposes the following rule:

(39) Extrametrical higher level constituents may dominate extrametrical lower level constituents.

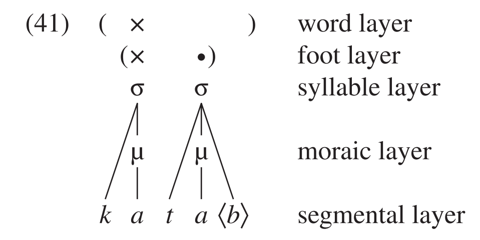
In San'ani, peripheral feet are eligible for foot extrametricality. In the derivation of *ˈmadrasih*, the peripheral (rightmost) foot is rendered extrametrical and is thus invisible to the stress rules. At the word layer, a continuous column of grid marks is produced by placing a grid mark above the only visible grid mark on the foot layer to give the stressed form *ˈmadrasih* 'school'—see (40).

(40)



Foot extrametricality is also subject to the Nonexhaustivity Condition (Hayes 1995: 58; cf. Prince 1983: 80). The Nonexhaustivity Condition ensures that foot extrametricality is blocked from applying where the peripheral foot is the only foot in the word, and where extrametricality would exhaust the entire domain of the stress rules. In *katab* 'he wrote', consonant extrametricality applies and a bimoraic foot is constructed over the two light syllables of the word. The peripheral foot constitutes the only foot in the word, therefore foot extrametricality is blocked from applying. Stress is assigned to the head of the foot, the leftmost syllable.

(41)



5.2.5 *Extrasyllabicity*

It has been demonstrated that certain consonants fall outside the domain of the syllable and remain unsyllabified until a late stage in the derivation. Since superheavy syllables (CVVC, CVCC) in Arabic are generally restricted to domain-final position (see also Section 4.3) while non-final syllables must have the structure CV, CVV, or CVC, it is assumed that the final consonant, C′, of superheavy syllables is extrasyllabic and is not incorporated into the adjacent syllable:

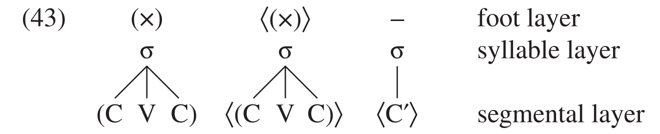
(42)

σ σ

(C V C) (C V C) C′

In contrast to extrametrical consonants, which link directly with the syllable node of the peripheral syllable, the extrasyllabic consonant falls into what Aoun (1979), Selkirk (1981), and Kager (1995: 376) describe as a degenerate syllable. Thus, word-final CVVC and CVCC syllables in languages which do not permit non-word-final CVVC and CVCC syllables are analysed as two syllables—a canonical

syllable plus a degenerate syllable.[5, 6] The role of the extrasyllabic consonant is different from that of the extrametrical consonant: an extrametrical consonant may be contained within an extrametrical foot, but an extrasyllabic consonant blocks foot extrametricality by virtue of coming between the foot and the rightmost edge of the word. An extrametrical foot adjacent to an extrasyllabic consonant would violate the Peripherality Condition (36) and result in 'chained' extrametricality (Hayes 1995: 107), illustrated in (43).

(43)


Hayes excludes chained extrametricality by the constraint in (44).

(44) Extrametricality does not chain; i.e. a constituent followed by an extrametrical constituent is not counted as peripheral.

5.3 WORD STRESS IN CAIRENE

A metrical analysis of stress in Cairene is fairly straightforward, in spite of the apparent complexity of surface forms (see Section 5.1.1). Cairene has a moraic trochee system. The foot parse takes place from left to right and degenerate feet are forbidden absolutely. In contrast to many other dialects of Arabic, foot extrametricality does not apply. Word construction rules assign stress to the head of the rightmost foot according to End Rule Right (ERR). The rules of stress assignment in Cairene are summarized in (45).

(45)

(a)	Consonant Extrametricality	C → ⟨C⟩ /___]word
(b)	Foot Construction	Form moraic trochees from left to right. Degenerate feet are forbidden absolutely.
(c)	Word Layer Construction	End Rule Right

Cairene has a number of unstressable morphemes which are cliticized to the following word (see Section 4.4): these include the verbal prefixes *bi-* (habitual/continuous), *ḥa-* (future), conjunctions *wi-* 'and' and *fa-* 'then', and the negative prefix *ma*. The dialect also has a few sub-minimal function words which are stressed only when they take a pronoun suffix (see Section 5.2.3). These include *miš* 'not' and the monomoraic prepositions *min* 'from', *ᶜan* 'about', and *fi* 'in'. The combined effect of consonant extrametricality and a ban on degenerate feet in

[5] Logically this means that languages which have final stress if and only if the final syllable is superheavy (such as Cairene) do not, in fact, ever have final stress but rather *penultimate* stress.

[6] In many dialects of Arabic, a prosodic difference exists between CVVC and CVCC syllables. Section 4.4.1.3 looks at word-internal CVVC syllables in San'ani, and Section 5.4.1 compares and considers in detail domain-final CVVC and CVCC syllables.

Cairene is exemplified in the derivation of *katabit* ‘she wrote’. The foot parse takes place from left to right. The two light syllables *ka.ta.* form a foot. The final syllable (with its extrametrical consonant, *t*) is light and cannot support a foot. Degenerate feet are banned absolutely in the dialect, so the final syllable remains unfooted. ERR assigns stress to the head of the rightmost foot, the initial syllable.[7]

```
(46)  ( ×              )     word layer construction (ERR)
        (×     •)            foot layer
         ˘     ˘     ˘
      k  a  t  a  b  i ⟨t⟩   segmental layer
```

Final superheavy syllables are analysed as a bimoraic syllable plus a degenerate syllable. The bimoraic syllable forms a canonical foot which is invariably stressed according to ERR. This is exemplified in *darast* ‘I/you m.s. learnt’:

```
(47)  (        ×     )       word layer construction (ERR)
              (×)            foot layer
         ˘     ¯
      d  a  r  a  s ⟨t⟩      segmental layer
```

In words which lack a final superheavy syllable, a heavy penult is invariably stressed. In *darastu* ‘I/you m.s. learnt it m.’, the first syllable cannot form a foot, nor can it constitute the head of a foot with the following bimoraic syllable. The heavy penult forms a foot. The final monomoraic syllable remains unfooted. Stress is assigned according to ERR to the only visible foot in the word:

```
(48)  (        ×        )    word layer construction (ERR)
              (×)            foot layer
         ˘     ¯        ˘
      d  a  r  a  s  t  u    segmental layer
```

A major difference between stress assignment in Cairene and that in many other eastern dialects of Arabic, including San’ani, Palestinian, Sudanese, and Abha Arabic, is in the treatment of peripheral feet. In Cairene, peripheral feet are not rendered extrametrical, while in other dialects (including Egyptian radio Arabic, according to Hayes’s 1995: 131–2 analysis of data in Harrell 1960) foot extrametricality appears to be at least optional. Lack of foot extrametricality explains the failure of the antepenultimate heavy syllable to be stressed in words such as *madrasa* ‘school’, *muškila* ‘problem’, and *maktaba* ‘library’. In the derivation of *muškila* ‘problem’, lack of foot extrametricality, which would have rendered the rightmost foot invisible to stress rules, ensures stress is assigned through ERR to the penultimate light syllable—see (49).

[7] In this and the following diagrams a macron indicates a bimoraic syllable, and a breve a monomoraic syllable.

(49)
```
(          ×       )    word layer construction (ERR)
  (×)     (×    •)      foot layer
   ‾       ˘    ˘
m u  š  k  i  l  a      segmental layer
```

Forms such as *ʔablak* 'he met you m.s.' (< /*ʔābil* + *ak*/) and *safru* 'they travelled' (< /*sāfir* + *u*/) have the same underlying heavy–light–light syllable structure as *madrasa* 'school'. However, in these words the high vowel of the penultimate syllable is deleted and stress assigned to the leftmost syllable. The prosodic difference between the two word types lies in the initial heavy syllable: CVV in the case of /*ʔābil* + *ak*/, CVC in the case of *madrasa*. In words with the template CVVCiCV(c) the parse proceeds according to the rules given in (45), with stress initially assigned to the penultimate syllable—the head of the rightmost foot:

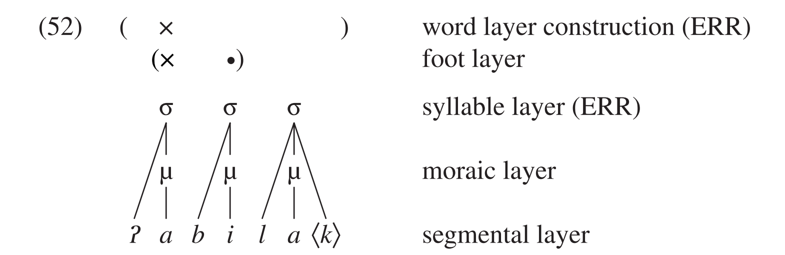
(50)
```
(        ×          )    word layer construction (ERR)
  (×)   (×     •)        foot layer
   ‾      ˘     ˘
ʔ  a: b  i   l  a ⟨k⟩    segmental layer
```

Unstressed long vowels are reduced in Cairene (see Section 9.1.1). The initial long vowel in the leftmost syllable is therefore subject to unstressed long vowel shortening:

(51)
```
 (×)      (×     •)      foot layer
  σ        σ     σ       syllable layer (ERR)
  μ  μ     μ     μ       moraic layer
ʔ  a     b  i  l  a ⟨k⟩  segmental layer
```

The resulting initial CV syllable can no longer support a foot. The foot parse applies again, locating the penultimate CV syllable in the weak element of the foot:

(52)



The unstressed high vowel in the penultimate syllable is subject to syncope (see Section 4.4.2.1), and the output is *ʔablak* 'he met you m.s.'

5.3.1 *Exceptions to the stress algorithm*

The two exceptions to the stress algorithm given in (2), and in particular the stress pattern of verbs in the {third person feminine singular} inflectional form in the perfect aspect, have exercised researchers over the years (Broselow 1976; McCarthy 1979*b*; Angoujard 1981). Where the {third person feminine singular} inflectional form takes a vowel-initial object suffix, /i/ of the {third person feminine singular} suffix always falls in a stressed syllable, irrespective of the number and weight of the preceding syllables in the word.[8] Likewise the light penult is always stressed in plurals with the structure CiCiCa or CuCuCa. Since both cases involve the exceptional stressing of a light penult, I shall consider these exceptions together.

Without an object suffix, the {third person feminine singular} inflectional form of the perfect verb is stressed according to the rules given in (45). Verbs with three light syllables or a heavy followed by a light syllable are stressed on the initial syllable, as in: *ˈḏ̣arabit* 'she hit' and *ˈšāfit* 'she saw'. *ˈḏ̣arabit* 'she hit' is diagrammed in (53).

```
(53)  (  ×           )     word layer construction (ERR)
        (×    •)           foot layer
         ˘    ˘    ˘
      ḏ̣ a r a b i t         segmental layer
```

Verbs with a heavy antepenult and two following light syllables are stressed on the penult, as in *ista*ᶜ*milit* 'she used':

```
(54)  (               ×       )     word layer construction (ERR)
       (×)    (×)    (×    •)       foot layer
        ¯      ¯      ˘    ˘
        i s t a ᶜ m i l i t          segmental layer
```

When the {third person feminine singular} inflectional form takes a vowel-initial object suffix (/ak/, /ik/, /u/) stress is invariably assigned to the light penult. In forms with four light syllables, stress appears to be placed predictably on the head of the rightmost foot:

```
(55)  (             ×      )     word layer construction (ERR)
        (×    •)  (×    •)       foot layer
         ˘    ˘    ˘    ˘
      k a t a b i t u            segmental layer
```

[8] McCarthy (1979*a*) adds a rule to Cairene grammar which constructs a special foot associating the rhyme of *-it-* with any node immediately following it, thereby placing *-it-* as the head of a final foot. Angoujard (1981: 89–90) attributes an 'indestructable rhyme' to the *-it-* morpheme. Later (1990: 120–1), he assigns special status to the *-it-* morpheme reflected in a three-slotted grid [* * *]. This analysis is both adequate and desirable for dialects such as Tunisian where /t/ of the morpheme is geminated on suffixation. However, for Cairene, this is a rather ad hoc device which provides a phonological explanation for a morphological fact—namely /i/ of the {third person feminine singular} morpheme is never deleted, and the syllable in which the morpheme falls always assigned word stress.

A form containing three light syllables, however, is also stressed on the penult, as in: *raˈmitu* 'she threw it m.'. This is identical to penultimate stress in CiCiCa or CuCuCa plurals, as exemplified by *ġiˈriba* 'crows', *siˈbita* 'baskets', *ḍuˈbu^{c}a* 'hyenas', *suˈbu^{c}a* 'lions' and *tuˈkusa* 'taxis'. Where a {third person feminine singular} verb + object suffix contains an underlying long vowel followed by two light syllables, the light penult is also stressed. Thus *šaˈlitu* 'she took it m.' (< /*šālit* + *u*/) contrasts with *ˈsafru* 'they travelled' (< /*sāfir* + *u*/) and *ˈʔablak* 'he met you m.s.' (< /*ʔābil* + *ak*/). In these cases, the rules in (45) suggest that stress is assigned exceptionally to the weak element of the foot, in violation of the Continuous Column Constraint:

(56)		
	*(×)	word layer construction (ERR)
	(× •)	foot layer
	˘ ˘ ˘	
	r a m i t u	segmental layer

There are a number of possible ways of dealing with these exceptional stress patterns—but all of them must make reference to the morphology. One possible solution would be to state that in specific lexicalized cases primary stress is assigned to the penultimate syllable; an alternative solution would be to state that left-headed binary foot construction takes place from *right to left* if and only if the {third person feminine singular} perfect verb + object suffix or the CiCiCa or CuCuCa plural is involved.

Let us consider the consequences of reversing the direction of stress assignment exceptionally. Stress would be assigned to *ramitu* 'she threw it m.' as follows. The rightmost two syllables *mi.tu.* form a left-headed foot. No foot is constructed over the initial light syllable *ra.* since it is sub-minimal. ERR applies assigning stress to the penultimate syllable:

(57)		
	(×)	word layer construction (ERR)
	(× •)	foot layer
	˘ ˘ ˘	
	r a m i t u	segmental layer

The form *kataˈbitu* 'she wrote it m.' would be constructed as follows. The rightmost two syllables *bi.tu.* form left-headed foot. A second left-headed foot is formed by the leftmost two syllables *ka.ta.* There are no stray syllables in the word. ERR assigns stress to the head of the rightmost foot, the penultimate syllable:

(58)		
	(×)	word layer construction (ERR)
	(× •) (× •)	foot layer
	˘ ˘ ˘ ˘	
	k a t a b i t u	segmental layer

The form *šaˈlitu* 'she carried it m.' would be constructed according to the rules proposed, with reduction of the unstressed long vowel (see Section 9.1.1):

(59)	(×)	word layer construction (ERR)
	(×) (× •)	foot layer
	¯ ˘ ˘	
	š a: l i t u	segmental layer
	a	unstressed long vowel reduction

Under a lexical approach, it is assumed that stress assignment in CiCiCa or CuCuCa plurals and the {third person feminine singular} perfect verb + object suffix is driven entirely by lexical factors: primary stress is assigned directly to the penult. There are historical reasons to assume that this is the correct analysis. The {second} and {third person masculine} singular object suffixes which are vowel-initial in Cairene today are consonant-initial in Standard Arabic, and are consonant-initial in Cairene when suffixed to vowel-final stems (cf. Section 7.1, Broselow 1976: 131). It is highly probable that the object suffixes were consonant-initial in all environments at some stage in the development of the language. At this stage, the vowel of the {third person feminine singular} morpheme would have been realized in a heavy syllable on suffixation of an object suffix, as in *kata**bit**hu* 'she wrote it m.' and *ra**mit**ki* 'she threw you f.s.', which contrast with today's *kata**bi**tu* 'she wrote it m.' and *ra**mi**tik* 'she threw you f.s.'. Stress would therefore have been assigned predictably to the penultimate heavy syllable. I conjecture that this historical stress pattern persisted after the {second} and {third person masculine} singular object suffixes became vowel initial during the development of the language.

Many of the CiCiCa plurals have an alternative and older pattern iCCiCa, as in *ġiriba* ~ *iġriba* 'crows', *diriᶜa* ~ *idriᶜa* 'arms', and *sibita* ~ *isbita* 'baskets' (Woidich 1999: 46). In the iCCiCa pattern, stress is assigned to the light penult according to (45). This is exemplified in the representation of *isbita* 'baskets' in (60).

(60)	(×)	word layer construction (ERR)
	(×) (× •)	foot layer
	¯ ˘ ˘	
	i s b i t a	segmental layer

As for the {third person feminine singular} verb + object suffix, it appears that this stress pattern was lexicalized and remained after iCCiCa was reanalysed as CiCiCa. I further conjecture that this penultimate stress pattern was generalized to additional plurals formed directly on the CiCiCa pattern, and to plurals formed on the CuCuCa pattern.

5.4 WORD STRESS IN SAN'ANI

Stress assignment in San'ani differs in two principal ways from that in Cairene. Firstly, while a final superheavy syllable is always stressed in Cairene, a penultimate or antepenultimate heavy open syllable (CVV) or syllable ending in the left leg of a geminate (CVG) takes precedence over a final CVVC/CVCC syllable

in San'ani. Thus, San'ani *ˈṣābūn* 'soap' contrasts with Cairene *ṣaˈbūn*; San'ani *ˈxārijīn* 'going out m.pl.' with Cairene *xarˈgīn*; San'ani *ˈjazzār* 'butcher' with Cairene *gazˈzār*; San'ani *mitˈʔaxxirāt* 'late f.pl.' with Cairene *mitʔaxxiˈrāt*; and San'ani *ˈdarrast* 'I/you m.s. taught' with Cairene *darˈrast*. Secondly, a heavy syllable is stressed in Cairene if and only if it occurs in penultimate position. If it occurs in antepenultimate position, the following light syllable is stressed. In San'ani, by contrast, a heavy antepenultimate syllable is stressed: Cairene *makˈtaba* 'library' contrasts with San'ani *ˈmaktabih* 'library', and Cairene *mudarˈrisa* 'teacher f.' with San'ani *muˈdarrisih* 'teacher f.' In the latter case, the difference between stress assignment in the two dialects is attributed to the permission of foot extrametricality in San'ani, but not in Cairene. In the former case, the difference in stress is due to a prosodic difference in San'ani between CVV/CVG syllables, on the one hand, and CVC syllables, on the other. The rules for assignment of word stress in San'ani are summarized below:

(61)	(a) Consonant Extrametricality	C → ⟨C⟩ /___]word
	(b) Foot Construction	Form moraic trochees from left to right. Degenerate feet are permitted in strong position [in limited prosodic environments].
	(c) Foot Extrametricality	Foot → ⟨Foot⟩ /___]word
	(d) Word Layer Construction	End Rule Right

As in Cairene, San'ani has a few unstressable morphemes and parts of morphemes which are cliticized to the preceding or following word (see Section 4.4). These include the copula *gad*, the verbal prefixes *bi-* (habitual), *ᶜa-* (future), the conjunctions *wa-* and *fa-*, and the initial syllable in form VII and VIII verbs where stress is assigned to the penultimate syllable,[9] as in: *yinˈšaġil* 'he is occupied', *yišˈtaġil* 'he works' and *yikˈtasib* 'he earns'.

San'ani *ˈmadrasih* exemplifies consonant and foot extrametricality:

```
(62)  (   ×                  )      word layer construction (ERR)
         (×)      ⟨(×     •)⟩        foot layer
          ‾         ˘     ˘
      m  a  d  r  a  s  i ⟨h⟩       segmental layer
```

The final consonant is rendered extrametrical. The foot parse proceeds from left to right. The first heavy (bimoraic) syllable forms a foot. The two following light syllables form a second foot. The rightmost foot is extrametrical since it is peripheral and does not exhaust the prosodic domain (see Section 5.2.4). ERR assigns stress to the rightmost visible foot.

[9] All these morphemes may be stressed in San'ani, however, either for metalinguistic reasons or as a result of stress fluctuation (see Section 5.4.4).

As in Cairene, heavy penults are stressed in words which contain no domain-final CVVC or CVCC. This is exemplified in (63) for *ʔabˈsartih* ‘I/you m.s. saw him/it m.’.

(63)		
	(×)	word layer construction (ERR)
	(×) (×)	foot layer
	¯ ¯ ˘	
	ʔ a b s a r t i ⟨h⟩	segmental layer

The final consonant is extrametrical. The foot parse applies from left to right. Two feet are formed. The rightmost foot is rendered non-peripheral by the final unfooted light syllable and is thus protected from extrametricality. Stress is assigned according to ERR.

Stems with the template CVCī such as *ṭaˈrī* ‘fresh’, and di- and trisyllabic verbs with a long vowel or diphthong suffix such as *yif*^{c}*aˈlū* ‘they m. do’, *yiˈjaw* ‘they m. come’ and *tišˈtay* ‘you f.s. want’ are stressed on the final long vowel or diphthong. Consider the representation of *yiktuˈbū* ‘they m. write’.

(64)		
	(×)	word layer construction (ERR)
	(×) (×)	foot layer
	¯ ˘ ¯	
	y i k t u b u :	segmental layer

A foot is constructed over the initial bimoraic syllable. The medial light syllable is skipped because it neither constitutes a foot on its own nor forms a foot with the following bimoraic syllable. The final CVV syllable forms a foot. ERR assigns stress to the head of the rightmost foot—the rightmost syllable.

One of the issues I address below is the failure of final CVV to be rendered extrametrical in trisyllabic words such as *yiktuˈbū*, *arjuˈlī*, and *yif*^{c}*aˈlū* in view of the fact that peripheral feet are extrametrical in San’ani subject to the Nonexhaustivity Condition. To appreciate the peculiarity of *yif*^{c}*aˈlū* forms consider the stress of trisyllabic words of the template CVCVCVV and the stress of quadrisyllabic words ending in CVV.

(65)		
	(×)	word layer construction (ERR)
	(× •) ⟨(×)⟩	foot layer
	˘ ˘ ¯	
	k a t a b u :	segmental layer

In contrast to *yif*^{c}*aˈlū*, the peripheral foot is rendered extrametrical and stress is assigned to the head of the rightmost visible foot to give *ˈkatabū* ‘they m. wrote’.

Consider now the derivation of the quadrisyllabic word *makˈtabatī* ‘my library’ in (66).

(66)		
	(×)	word layer construction (ERR)
	(×) (× •) ⟨(×)⟩	foot layer
	¯ ˘ ˘ ¯	
	m a k t a b a t i :	segmental layer

Foot construction creates three binary feet. The rightmost foot formed by a CVV syllable is rendered extrametrical and stress is assigned according to ERR to give *mak'tabatī* 'my library'.

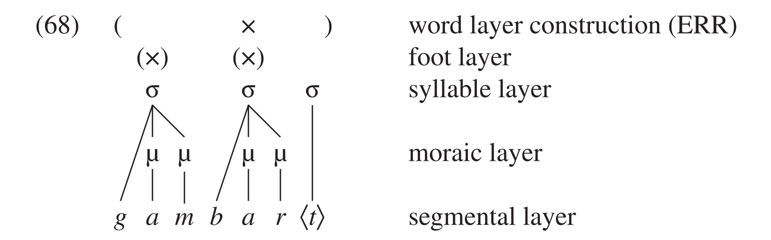
The extrametricality of final CVV in specified prosodic domains is related to the unusual behaviour of CVV and CVG syllables, particularly in the environment of final CVVC/CVCC syllables. In Section 5.4.1 I look at the common account of domain-final CVVC/CVCC as a canonical syllable plus an extrasyllabic consonant and show that this analysis cannot account for the stress patterns of words with final CVVC/CVCC and non-final CVV/CVG syllables. I then consider stress patterns in suffixation which demonstrate that stress tends to shift to the right in suffixed words if and only if no non-final CVV/CVG syllable is contained within the word. In Section 5.4.1.2 I adopt Hayes's syllable-internal two-layer moraic grid which enables us to capture the fact that CVC in San'ani is prosodically heavy in some environments but not in others. Underlyingly moraic elements are assigned a mora at the upper and lower moraic layers, while elements which become moraic through Weight-by-Position are assigned a mora at the lower layer only. In Section 5.4.2 I return to the issue of final CVV syllables and demonstrate that the two-layer moraic grid sheds light on the behaviour of CVV-final words: the peripheral CVV foot is rendered extrametrical if and only if an adjacent foot comprises two moras on each of the moraic layers.

5.4.1 *Domain-final CVVC/CVCC*

Under the common account of domain-final superheavy syllables, C' of a CVXC' syllable is described as extrasyllabic (Hayes 1995: 106–7, Kager 1995: 376) or forms a degenerate syllable (Aoun 1979; Selkirk 1981), as in (67).

(67) σ ⟨σ⟩
C V X ⟨C⟩

The extrasyllabic consonant blocks extrametricality of the adjacent syllable and bimoraic foot, CVV or CVC, by depriving this syllable of peripherality (see Section 5.2.5). In *gam'bart* 'I/you m.s. sat', stress is assigned as follows:

(68)


A foot is constructed over the heavy syllable *.gam.* A second foot is constructed over the syllable *.bar*. Foot extrametricality is blocked by the presence of the degenerate syllable, and stress is assigned according to ERR.

This type of analysis cannot, however, explain the stress pattern in San'ani words where the ante/penultimate syllable is CVV/CVG and the final syllable is superheavy. Word stress fails to be assigned to either a final CVVC or a final CVCC syllable in these cases: *gam'bart* 'I/you m.s. sat' contrasts with *'dawwart* 'I/you m.s. looked for' and *'sāfart* 'I/you m.s. travelled'; and *mak'tūb* 'letter' contrasts with *'jazzār* and *'ṣābūn* 'soap'.

The stress pattern of words ending in CVCC or CVVC in San'ani is dependent on whether or not a non-final CVV or CVG syllable falls in the word. Thus, there must be some prosodic difference between CVC and CVV/CVG syllables, syllables which in most other dialects of Arabic are prosodically identical. While in some languages (although no modern Arabic dialects of which I have knowledge) CVC acts as a light syllable, we cannot say that CVC is light in San'ani, since it is not treated as light in all environments: in trisyllabic words in which the penultimate syllable is CVC and the initial syllable is CV, CVC is stressed:

(69)	*zu'murjad*	'emerald'
	mi'gambar	'sitting'
	mi'laxbaṭ	'smudged'
	ḏ̣a'rabhum	'he hit them m.'
	ka'tabtih	'I/you m.s. wrote it m.'

If CVC were treated as monomoraic in these cases, stress would be placed on the first syllable (which would form a bimoraic foot with the following syllable), as it is in words comprising three light (CV) syllables, as in (70).

(70)	*'libisat*	'she put on, wore'
	'katabat	'she wrote'
	'kutubih	'his books'
	'bagarih	'cow'

Before I propose a prosodic analysis of CVG and CVC syllables in San'ani, I shall consider the stress patterns of suffixed words in Arabic.

5.4.1.1 *Stress patterns in suffixation*

In a typical trochaic-type dialect of Arabic, stress shifts to the right when a consonant-initial suffix is affixed to the word. Stress shift is exemplified in the following words from Cairene:

(71)	*'katab*	'he wrote'	*'darras*	'he taught'
	ka'tabha	'he wrote it f.'	*dar'rasha*	'he taught her'
	ma-katab'hāš	'he didn't write it f.'	*ma-darras'hāš*	'he didn't teach her'

In San'ani, by contrast, stress shift fails to take place when the word is stressed in its non-suffixed form on either a CVG syllable or a CVV syllable. Consider the examples in (72).

(72)	(a)	*aˈdawwir*	'I look for'	*ˈkassar*	'he broke'
		aˈdawwirhum	'I look for them m.'	*ˈkassarhā*	'he broke it f.'
	(b)	*ˈgālat*	'she said'	*ˈjārih*	'neighbour f.'
		ˈgālatlih	'she said to him'	*ˈjāratnā*	'our neighbour f.'
	(c)	*xaˈbāyir*	'friends f.'		
		xaˈbāyirhā	'her friends f.'		

Similarly, when a word is stressed in its non-suffixed form on an antepenultimate CVG or CVV syllable, stress does not shift when a suffix is added:

(73)	*muˈsajjilih*	'recorder'	*ˈhākaḏā*	'like this'
	muˈsajjilatī	'my recorder'	*ˈhākaḏahā*	'like this [emphatic]'

In the unmarked case, stress does shift to the right, however, when the non-suffixed word is stressed on either a CV or CVC syllable:[10]

(74)	(a)	*ˈarxaṣ*	'cheaper'	*ˈaškal*	'better'
		arˈxaṣlih	'cheaper for him'	*ašˈkallih*	'better for him'
	(b)	*ˈḏ̣arab*	'he hit'		
		ḏ̣aˈrabkum	'he hit you m.pl.'		
	(c)	*ˈmaktabih*	'library'		
		makˈtabatī	'my library'		

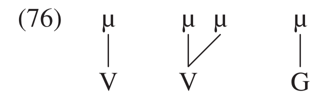
Stress also shifts to the right from a CVV syllable where the final syllable of the non-suffixed word is CVVC or CVV:

(75)	*ˈjīrān*	'neighbours'	*jīˈrānih*	'his neighbours'
	aˈsāmī	'names'	*asāˈmīhum*	'their m. names'

5.4.1.2 *The representation of CVG versus CVC*

Stress shift in suffixed words fails to apply from a CVG (or CVV) syllable to a CVC syllable for precisely the same reasons that domain-final CVXC is stressed when the adjacent syllable is CVC but not when it is CVG (or CVV). The asymmetrical behaviour of CVC and CVG syllables indicates that at some level these syllables are not prosodically identical. Recall that in the moraic model assumed, underlying vowels are assigned a single mora, underlying long vowels, two moras, and underlying geminate consonants, a single mora, as in (19), repeated here as (76).

(76)

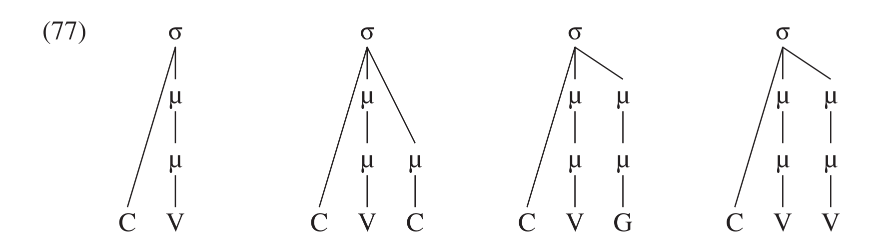


Although non-geminate consonants in the rhyme are assigned a mora at a later stage by Weight-by-Position (WP), geminate consonants are moraically distinct

[10] All of these words may take initial stress when the elative or the action of the verb is emphasized.

from non-geminate consonants at the level of underlying representation. I assume that it is this underlying moraic distinctness which accounts for the asymmetry in San'ani between CVC and CVG syllables. The underlying moraic distinctness can be captured by adopting a two-layered grid within the syllable, where the height of a column depends on the sonority of the segment associated with it (Hayes 1995: 300, drawing on Prince 1983). Segments which are underlyingly moraic have a mora on each of the two layers, while segments which are assigned a mora by WP have a mora on the lower layer only:

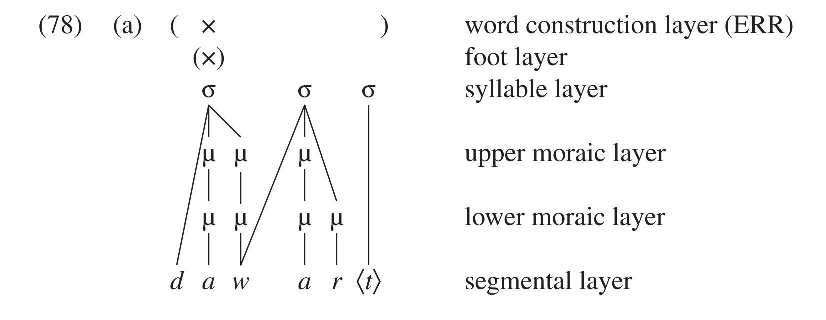
(77)

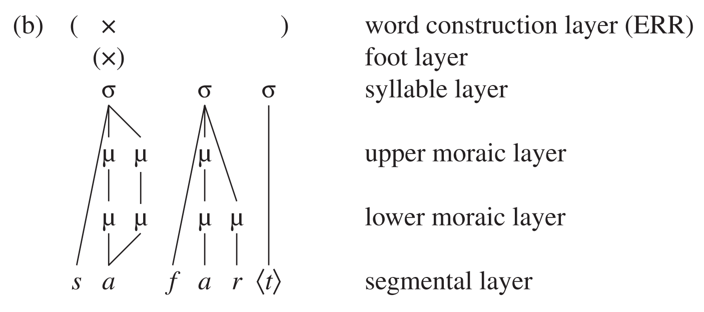


Processes which treat CVC as heavy refer to the lower moraic layer, while processes which treat CVC as light refer to the upper moraic layer (Hayes 1995: 300). Hayes suggests that the requirements of syllable-external prosody, including footing and word minima, are characteristically enforced at the upper moraic layer, while syllable-internal requirements such as mora population limits are characteristically enforced at the lower layer (Hayes 1995: 300). In San'ani, however, the weight of CVC syllables is entirely dependent on the prosodic environment. I therefore conjecture that footing is enforced on the upper moraic layer if and only if there are underlyingly bimoraic syllables in a word; if not, footing is enforced on the lower moraic layer.

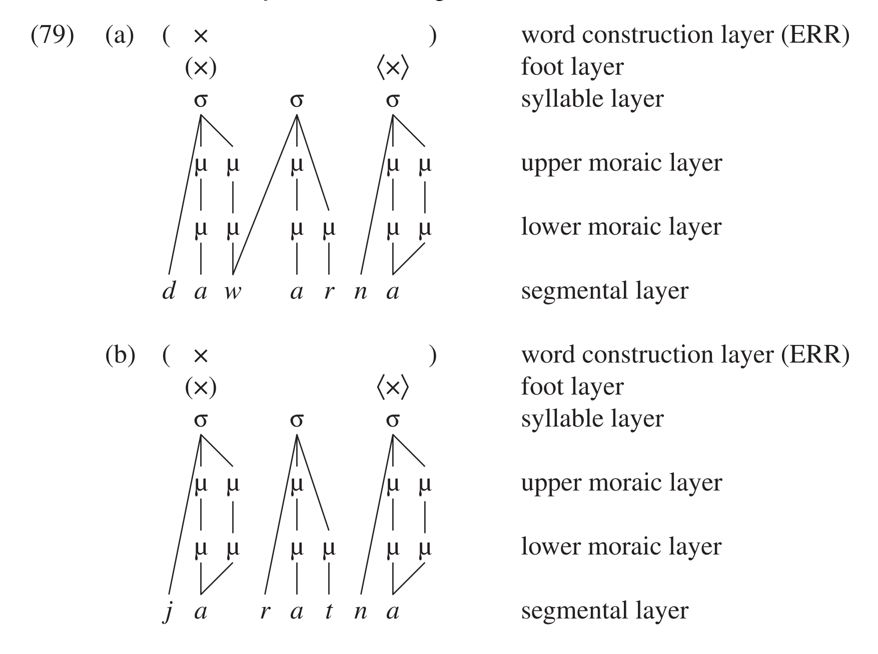
The proposed analysis accounts for the failure of superheavy CVCC syllables to be stressed if a non-final CVV or CVG syllable falls within the word. Consider the representations of *ˈdawwart* 'I/you m.s. looked for' and *ˈsāfart* 'I/you m.s. travelled' in (78).

(78) (a)





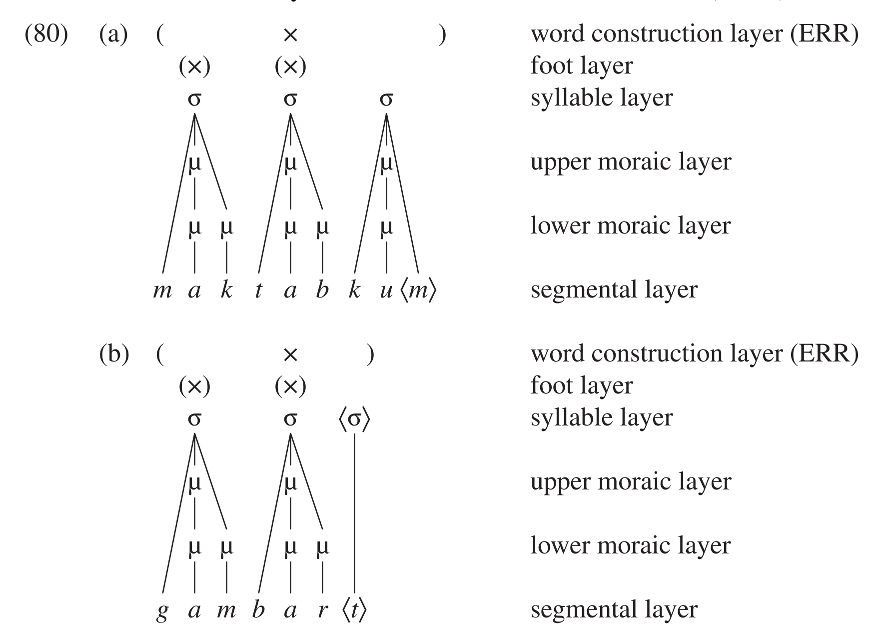
In these examples, a disparity in sonority between the initial and penultimate syllable exists on the upper moraic layer: the penultimate syllable has a single mora while the initial syllable has two moras. At this layer, a foot is constructed over the initial syllable, but no foot over the penultimate syllable. In both cases, stress is assigned to the initial syllable, the only visible foot. Stress assignment in *ˈdawwart* and *ˈsāfart* is similar to that in other suffixed words which contain non-final CVV/CVG syllables. Consider the representations of *ˈdawwarnā* 'we looked for, he looked for us' and *ˈjāratnā* 'our neighbour f.' in (79).



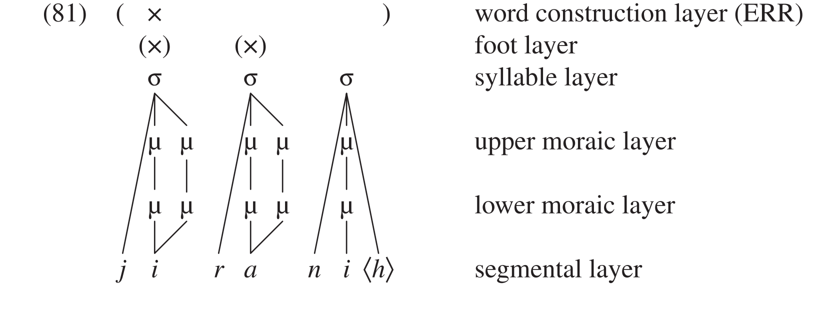
In these examples, a foot is constructed over the initial syllable and a second foot over the suffix *-nā*. The peripheral foot meets the conditions for extrametricality, and stress is assigned to the rightmost visible foot.

When the stressed syllable of a non-suffixed word is CV or CVC, stress does shift to the right on suffixation of a consonant-initial suffix. In this case, the

stressed syllable of the non-suffixed word is equally sonorous to the stressed syllable of the suffixed word (bimoraic on the lower moraic layer only). Foot construction scans the upper moraic layer, and since no bimoraic syllables are attested at this layer, footing refers to the lower moraic layer. Stress is assigned to the syllable in the stronger position (rightmost non-extrametrical). This is exemplified in *mak'tabkum* 'your m.pl. office' and *gam'bart* 'I/you m.s. sat', both of which are stressed on the leftmost syllable in their non-suffixed form—see (80a, b).



The parse of *maktabkum* 'your m.pl. office' and *gambart* 'I/you m.s. sat' is similar to that of suffixed words with two adjacent CVV syllables such as *jīrānih* 'his neighbours' and *ṭīgānuh* 'his/its m. windows', in which the initial and penultimate syllables are equally sonorous (in this case, bimoraic on the upper layer). Once again, since the initial syllable does not enjoy greater sonority than the penultimate syllable, word stress is assigned to the syllable with the stronger (rightmost) position:



5.4.1.3 *Stress assignment in CVVC-final words*

The present analysis does not, however, explain the stress patterns of words with a non-final CVV/CVG syllable ending in CVVC. Recall that words such as *jazzār* 'butcher', *ṣābūn* 'soap', *mudarrisīn* 'teachers m.', and *xārijīn* 'going out m.pl.' are stressed on the leftmost CVV/CVG syllable. The reason for this stress pattern, I propose, lies in the fact that CVVC and CVCC syllables are not prosodically identical, a fact which has long been observed for a number of eastern dialects of Arabic including Classical Arabic (Bohas 1975 for Classical Arabic; Aoun 1979: 145 for Lebanese; Selkirk 1981: 214 for Cairene; Broselow 1992; Broselow *et al.* 1995, 1997; Watson 1999*c*). The analysis below draws partly on work by Selkirk (1981), whereby CVVC syllables in Cairene are analysed as a single superheavy syllable, while CVCC syllables are analysed as a canonical syllable plus a degenerate syllable, and partly on work by Broselow (1992) and Broselow *et al.* (1995, 1997).

In 1992, Broselow noted an asymmetry between CVVC and CVCC syllables in some dialects of Arabic (notably Sudanese, Syrian, Iraqi, Lebanese, and Gulf dialects). In these dialects, it was seen that while CVVC syllables are not attested morpheme-internally, they are attested in derived environments once subject suffixes (in the case of verbs with the perfect aspect template CVVCVC) and/or object or possessive suffixes (in the case of verbs or nouns with the template (CV)CVVC) are suffixed. Thus, in Lebanese, */kitāb + na/* is realized as *kitābna* 'our book', whereas in Cairene and Alexandrian it is realized as *kitabna* (Broselow *et al.* 1995: 129). In Sudanese, */māsik + īn/* is realized as *māskīn*, but as *maskīn* in Cairene and Alexandrian. The syllable CVCC, by contrast, is never attested word-internally in any of these dialects. Similarly, in Standard Arabic, word-internal CVVC syllables are the regular outcome of active participle formation from doubled (final geminate) roots (Wright 1971: 26) (case endings in round brackets):

(82) *mādd*(*un*) 'stretching'
mārr(*un*) 'passer-by'
fārr(*un*) 'fugitive'
lāmma(*tun*) 'evil eye' (examples from Wehr's dictionary)

Conversely, CVCC syllables are only ever attested word-finally in Standard Arabic in low-style speech when final vowels and case markers are omitted (final vowels and case markers in round brackets):

(83) *dars*(*un*) 'lesson'
šarq(*un*) 'east'
katabt(*a*) 'you m.s. wrote'
katabt(*u*) 'I wrote'

In the discussion of San'ani syllable structure, we saw that while CVCC syllables are restricted to word-final position, CVVC syllables are optional in derived environments: 'her book' may be realized as either *kitābhā* or *kitābahā* (see Section 4.4.1.3).

In order to account for word-internal CVVC syllables in derived environments, Broselow proposes an analysis whereby the final C is adjoined to the second mora of the long vowel (see Section 4.4.1.3). Later laboratory work demonstrated that the vowel of word-internal CVVC syllables is shorter than that of word-internal CVV syllables, but longer than that of CVC syllables, thus supporting a bimoraic analysis of a three-element rhyme. For a Lebanese speaker, the vowel /ā/ in *kitābna* (97.8 msec) was shorter than /ā/ in *kitābi* (115.4 msec) but longer than /a/ in *ᶜinabna* (65 msec) (Broselow *et al.* 1995, 1997).

CVVC syllables may differ from CVCC syllables, however, not only in word-internal derived environments, but also word-finally. In Standard Arabic, CVVC syllables may occur at the end of a poetic line and therefore participate in rhyme, but CVCC syllables are banned in this position (Bohas 1975, cited in Broselow 1992: 16). In Cairene, CVVC syllables are attested phrase-finally within the utterance, but CVCC syllables induce epenthesis in all but utterance-final position, as in (84).

(84) *kān hina* 'he was here' but *kunt**i** hina* 'I was/you m.s. were here'

In Central Sudanese, CVVC syllables are attested word-finally (as well as word-internally), but CVCC syllables are attested word-finally only where final geminates are involved—see (85)—or in loan words ending in NC—as in (86)—(examples from Hamid 1984: 24).

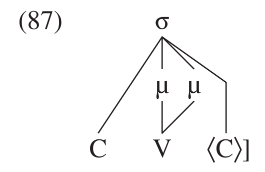
(85) *masann* 'sharpener'
umm 'mother'
jidd 'grandfather'

(86) *bumb* 'bomb'
bank 'bank'
tank 'tank'

Nouns which correspond to CVCC nouns in Standard Arabic and in a number of other modern dialects are otherwise realized as CVCiC in Sudanese, as in: *isim* 'name' (cf. Cairene *ism*), *ṭifil* 'child' (cf. Cairene *ṭifl*), *barid* 'cold' (cf. Cairene *bard*). Verbs in the {first person singular} or {second person masculine singular} inflectional form in the perfect aspect are realized with final *-a*, as in: *katabta* 'I/you m.s. wrote' (cf. Cairene *katabt*).

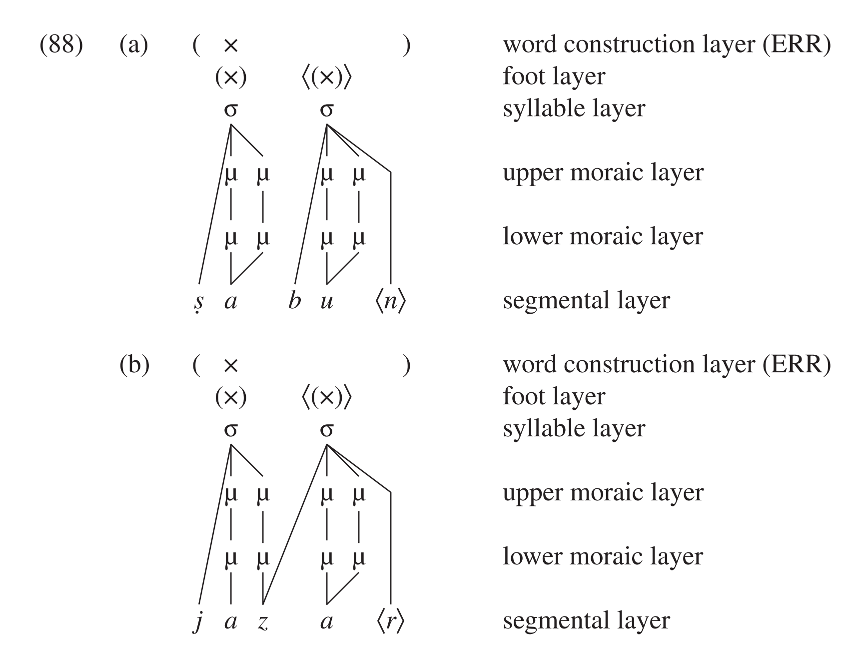
The stress pattern of words with final CVVC and non-final CVV or CVG syllables in San'ani is attributable to the permissibility of CVVC syllables in positions in which CVCC syllables are not attested: just as the final C in CVVC syllables is analysed as the coda consonant word-internally in San'ani, it is analysed as a coda consonant in word-final CVVC syllables. The bimoraic analysis is maintained in word-final position, not through the Adjunction-to-Mora rule proposed by Broselow for word-internal CVVC syllables, but through analysing the final consonant as extrametrical rather than extrasyllabic. Word-final CVVC is analysed as single bimoraic syllable with an extrametrical consonant which attaches directly to the syllable node, as in (87).

(87)



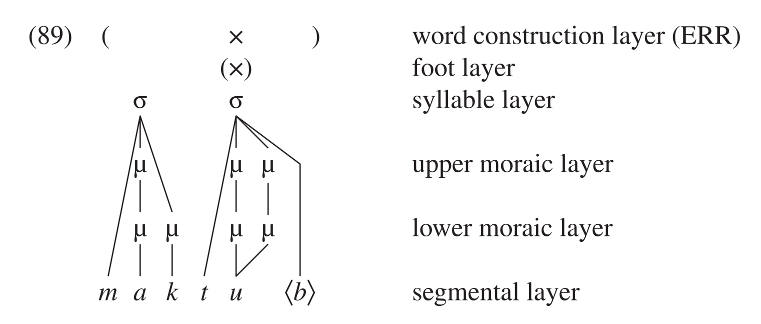
Under this analysis, final CVVC forms a single peripheral bimoraic foot. Combined with the moraic grid proposed above, the foot formed by word-final CVVC is eligible for extrametricality subject to the Nonexhaustivity Condition (see Section 5.2.4)—that is, if and only if other bimoraic syllables on the upper moraic layer occur in the word. In the derivations of *ˈṣābūn* 'soap' and *ˈjazzār* 'butcher' in (88a, b), two bimoraic feet are constructed on the upper moraic layer. The peripheral foot is rendered extrametrical, and stress is assigned to the rightmost visible foot.

(88)



These examples compare with a word such as *maktūb* 'letter' in which the penultimate syllable is CVC and the final syllable CVVC: the disparity in sonority between the penultimate and final syllable is seen on the upper layer where the final syllable is bimoraic and the initial one monomoraic. On the upper moraic layer, a foot is constructed over the final CVVC syllable, but no foot over the penultimate syllable. Foot extrametricality fails to apply since extrametricality would render the word footless at the upper layer, and stress is assigned to final CVVC—see (89).

(89)



5.4.2 *Domain-final CVV*

The proposed two-layer moraic analysis provides us with a partial explanation for the problematic stress pattern of trisyllabic and quadrisyllabic words ending in CVV. In words with the template CVCCVCVV, CVCCVV, and CVCVV, stress is assigned to the domain-final CVV syllable (see Section 5.4):

(90) *yiktuˈbū* ‘they m. write’
yifˁaˈlū ‘they m. do’
yišˈtaw ‘they m. want’
ṭaˈrī ‘fresh’

In verbs with an antepenultimate or penultimate CVV or CVG syllable, however, stress is placed on the CVV or CVG syllable:

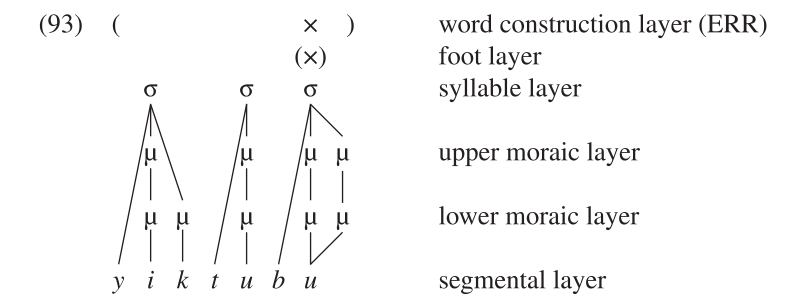
(91) *yiˈḥibbū* ‘they m. like’
ˈbazzū ‘they m. took’
ˈsāfarū ‘they m. travelled’

And in quadrisyllabic words and in trisyllabic words with the template CVCVCVV, stress is placed on the leftmost light syllable:[11]

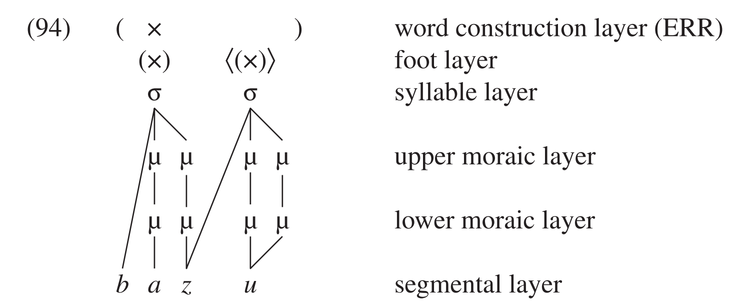
(92) *makˈtabatī* ‘my library’
yixˈtalifū ‘they m. differ’
ˈkutubī ‘my books’

In the case of *yiktuˈbū* forms, foot construction scans the upper moraic layer. A foot is constructed over final CVV, the only underlyingly bimoraic syllable. Since no other feet are constructed at this layer, ERR assigns stress to the head of the only foot—see (93).

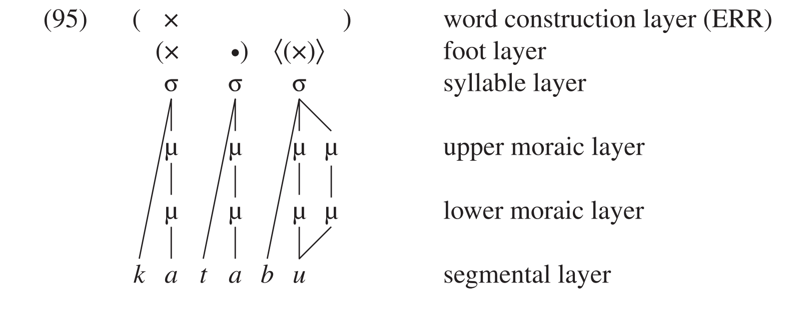
[11] Unless the stressed syllable of the unsuffixed word is either CVV or CVG. I present an analysis of this type of word below.



The analysis of forms with antepenultimate or penultimate CVV or CVG syllables and final CVV, such as *ˈbazzū* 'they m. took', is similar to that of words with the template CVVCVVC and CVGGVVC. The two-layered moraic grid reveals two equally sonorous bimoraic syllables. Two feet are constructed at the upper moraic layer rendering the peripheral (CVV) syllable eligible for extrametricality. Stress is assigned to the rightmost visible foot according to ERR:



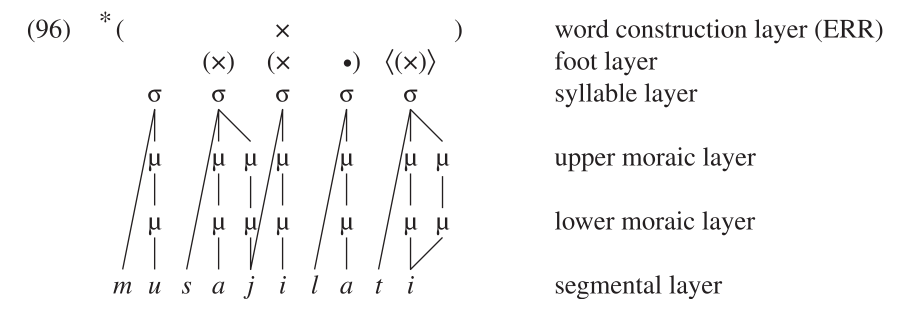
The analysis of words with antepenultimate and penultimate CV syllables, such as *makˈtabatī* 'my library' and *ˈkatabū* 'they m. wrote', considered at the beginning of Section 5.4, is no less straightforward. Foot construction scans the upper moraic layer and creates two feet. In both cases, the penultimate foot is equally sonorous to the final foot—both feet comprise two moras on each of the moraic layers. The final foot is eligible for extrametricality, and stress is assigned to the head of the rightmost visible foot, the antepenultimate syllable. This is exemplified in the representation of *ˈkatabū* 'they m. wrote'.



5.4.3 *Suffixed words with pre-antepenultimate CVV or CVG syllables*

The two-layered moraic grid on its own is insufficient to explain the stress assignment of suffixed words in which the pre-antepenultimate syllable is either CVV or CVG. Where a word with an antepenultimate CVV or CVG syllable takes a suffix, stress fails to shift from the CVV or CVG syllable in the suffixed form and this word is stressed on the pre-antepenultimate syllable, as in *ˈhākaḏahā* 'like this' and *muˈsajjilatī* 'my recorder'. This contrasts with suffixed words in which the pre-antepenultimate syllable is CVC, as in *makˈtabatī* 'my library'. A two-layered moraic grid alone would not allow stress to be assigned further left than the antepenultimate syllable:

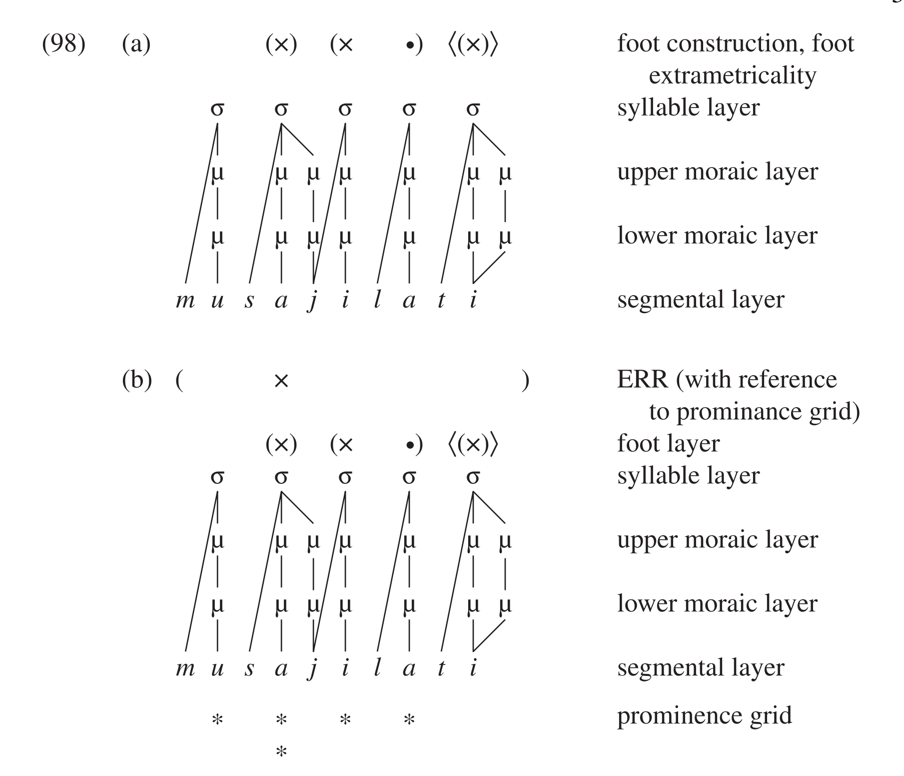
(96)



Forms such as *ˈhākaḏahā* 'like this' and *muˈsajjilatī* 'my recorder' demonstrate that a foot constructed over a CVV/CVG syllable is more prominent than a foot comprising two light syllables, and that a CVV/CVG syllable will take precedence even where this does not constitute the rightmost visible foot. The relative prominence of CVV/CVG syllables can be accounted for by adding a prominence component to the grid. A prominence grid was proposed by Hayes (1995: 284) to account for the optional stress of initial heavy syllables in words with the template VCCVCVCVC such as *ˈankitalaw* in Negev Bedouin Arabic. In San'ani, however, reference must also be made to the upper layer of the two-layer moraic grid in order to prevent the prominence grid singling out non-final CVC syllables as prominent. The prominence grid is constructed on the basis of the following Prominence Projection:

(97) Prominence Projection
Project a prominence grid as follows:
**: heavy syllables (CVV/CVG)
*: light syllables (CV/CVC)

We then apply ERR to derive the correct results. Consider the derivation of *muˈsajjilatī* 'my recorder' in (98).



In the majority of Arabic dialects, non-domain-final CVC and CVV/CVG syllables are treated as prosodically identical heavy syllables. In San'ani, however, CVC syllables are treated as heavy if and only if not adjacent to a non-final CVV or CVG syllable and, in contrast to CVV/CVG syllables, fail to retract stress from domain-final CVVC or CVCC. The dual nature of CVC syllables in this dialect is accounted for by a two-layer analysis of sonority: underlyingly moraic segments have a mora on each moraic layer, while segments which are assigned a mora by the Weight-by-Position condition have a mora on the lower layer only. Foot construction scans the upper moraic layer in the first instance, looking at the lower moraic layer if and only if bimoraic syllables are not attested at the upper layer. This analysis sheds light on the stress of words ending in CVCC: an underlyingly bimoraic syllable to the left of CVCC attracts stress since the CVV/CVG syllable will form the only foot on the upper moraic layer; where a CVC syllable falls to the left of CVCC, by contrast, both syllables are monomoraic on the upper moraic layer and bimoraic on the lower layer. The foot parse refers to the lower moraic layer and stress is assigned by ERR to the rightmost foot. The two-layer analysis also provides an explanation of asymmetrical stress patterns of words which end in a long vowel: stress is assigned to the final foot if and only if two binary feet can-

not be constructed on the upper moraic layer. If the word has two equally sonorous feet, the foot constructed over the final long vowel is eligible for extrametricality and the head of the penultimate foot is stressed according to ERR.[12]

The failure of domain-final CVVC to attract stress when a CVV or CVG syllable occurs in the word is attributed to the permissibility of CVVC syllables in positions in which CVCC syllables are not attested. Following Broselow (1992) and Broselow *et al.*'s (1995, 1997) bimoraic analysis of word-internal CVVC syllables in several Arabic dialects and Selkirk's (1981) analysis of domain-final CVVC as a single superheavy syllable, the domain-final behaviour of CVVC syllables is attributed to an extrametrical rather than an extrasyllabic analysis of the final C. Word-finally, a CVVC sequence is analysed as a single bimoraic syllable which forms a peripheral foot. Where a final CVVC syllable occurs in the same word as an equally sonorous CVV/CVG syllable, it is eligible for extrametricality by virtue of satisfying both the Peripherality Condition and the Nonexhaustivity Condition.

The two-layer moraic grid analysis does not, on its own, provide an account of the stress of suffixed words in which a pre-antepenultimate CVV/CVG syllable is stressed. For cases such as these I propose that a prominence component is added to the grid as suggested by Hayes for the analysis of optional initial stress in words with the template VCCVCVCVC in Negev Bedouin Arabic.

5.4.4 *Stress fluctuation*

The word-stress rules discussed above hold for the stress of words in isolation and, in the main, for the stress of words which do not have particular prominence within the utterance. In contrast to Cairene, however, San'ani is subject to significant stress fluctuation in connected speech. Stress fluctuation may be due to one of four factors: the optionality of foot extrametricality, stress migration within the foot, a weak prohibition on degenerate feet, and optional mora extrametricality.[13]

5.4.4.1 *Failure of foot extrametricality*

In the majority of Arabic dialects, foot extrametricality either applies or does not apply. In Egyptian radio Arabic, foot extrametricality appears to be optional (Hayes 1995: 131). In San'ani, foot extrametricality applies invariably when the word occurs in isolation, but may fail to apply in connected speech. In words with final and ante/penultimate long vowels or a final long vowel and an ante/penultimate CVG syllable, foot extrametricality excludes the final foot from stress assignment, as seen above, and repeated here as (99).

[12] More research is needed on the working of the two-layered moraic grid in San'ani. It appears to be necessary only where underlyingly bimoraic syllables are attested in a word. When the word ends in two short (CV) syllables, as in *ˈmaktabih* 'library', it is not invoked (if it were, the peripheral foot would constitute the only foot in the word and the penultimate syllable would be stressed).

[13] Standard Arabic words in Cairene are argued to have optional Mora Extrametricality, although doubts have been expressed about the descriptive validity of Mora Extrametricality (Hayes 1995: 69).

(99) (×) word layer construction (ERR)
(×) ⟨(×)⟩ foot layer
– –
x u ṭ: a:⟨f⟩ segmental layer

Where foot extrametricality does not hold, however, the final foot is open to stress assignment through ERR, and stress is assigned to the final syllable:

(100) (×) word layer construction (ERR)
(×) (×) foot layer
– –
x u ṭ: a:⟨f⟩ segmental layer

In quadrisyllabic words comprising four light syllables or trisyllabic words comprising a heavy syllable followed by two light syllables, the two final light syllables form a peripheral foot which is extrametrical in regular word stress, as exemplified in *ˈdarasatih* 'she learnt it m.' and *ˈmaktabih* 'his office'. When foot extrametricality fails to apply in connected speech, however, stress is placed on the head of the peripheral foot by ERR to give *daraˈsatih* 'she learnt it m.' and *makˈtabih* 'his office';[14] see (101).

(101) (×) word layer construction (ERR)
(×) (× •) foot layer
– ᴗ ᴗ
m a k t a b i ⟨h⟩ segmental layer

5.4.4.2 *Stress migration*

In form VII and form VIII verbs with the template (C)VCCVCVC and words with the template CVCVC, stress often shifts from the penultimate to the final syllable (see Section 4.4.2.2). This is particularly the case in pre-pausal position. When stress shift occurs, the destressed vowel in the penultimate syllable is frequently subject to syncope, as in the examples in (102).

(102)	*/yiktasib/*	*yiktaˈsib ~ yiktˈsib*	'he earns'
	/yiftahin/	*yiftaˈhin ~ yiftˈhin*	'he rests, feels better'
	/yintahī/	*yintaˈhī ~ yintˈhī*	'he finishes'
	/iftahan/	*iftaˈhan ~ iftˈhan*	'he rested, felt better'
	/lafat/	*laˈfat ~ lˈfat*	'he turned'
	/katab/	*kaˈtab ~ kˈtab*	'he wrote'
	/xašab/	*xaˈšab ~ xˈšab*	'wood coll.'
	/firag/	*fiˈrag ~ fˈrag*	'groups'

[14] In Makkan Arabic, similar stress fluctuation is also attested in words with the template CVCVCVCV (Ingham 1971: 292).

In words with the template CVCVCVC, stress may shift from the initial to the penultimate syllable, as in (103).

(103)	/*xašabih*/	*xˈšabih*	'piece of wood'
	/*ḥuṣamuh*/	*ḥˈṣamuh*	'pebble, gravel, stone'
	/*faᶜilih*/	*fˈᶜilih*	'problem'
	/*katabat*/	*kˈtabat*	'she wrote'

In all these cases, stress migrates rightwards to the adjacent syllable within the foot and the destressed vowel is optionally subject to syncope (represented in (104) as 0).

(104)			Stress migration		Syncope (optional)
(a)	(× •) *l a f a t*	>	(• ×) *l a f a t*	>	(×) *l 0 f a t*
(b)	(× •) *y i f t a h i n*	>	(• ×) *y i f t a h i n*	>	(×) *y i f t 0 h i n*
(c)	(× •) *x a š a b i h*	>	(• ×) *x a š a b i h*	>	(×) *x 0 š a b i h*

Hayes notes a similar process of stress migration in his analysis of data from a number of other conservative dialects of Arabic (Bani-Hassan Bedouin, Tripoli, Bedouin Hijazi, Cyrenaican Bedouin, and the semi-nomadic dialect of al-'Ajarma; cf. Palva 1976: 24) (Hayes 1995: 42; cf. Kager 1995: 387–8). In these cases, however, stress migration is invariably accompanied by syncope of the destressed vowel. For these dialects, Hayes assumes it is the strong vowel which is subject to deletion and that strong vowel deletion occasions stress migration.

The examples of stress migration given here for San'ani and in Hayes for other conservative dialects of Arabic demonstrate that the direction of migration can be predicted from the bracketed grid: stress marks may not move outside a bracketed domain. In a language with initially stressed feet, such as San'ani, stress migrates to the right; in a language with finally stressed feet, such as Cyrenaican Bedouin Arabic, stress migrates to the left. In all cases, the theory predicts that stress migrates within the foot.

5.4.4.3 *Stress of degenerate feet*

The status of degenerate feet and the effect of pause in San'ani was discussed earlier in this chapter. As examples have shown, not all sub-minimal elements are parsed as degenerate feet. Degenerate feet are formed only when adjacent to pause, following the definite article and after the first term of a genitive phrase (cf. Section 5.1.2). Consider the following post-pause (105a) and pre-pause (105b) examples.

(105) (a) *ˈtamām* 'okay'
ˈšad̠āb 'rue'
(b) *ḥafˈlih* 'party'
šikˈmih 'lunch party for parturient'
xāˈlih 'maternal aunt'
yuxˈlaṭ 'he mixes'
aḥˈmad '[proper name]'

I assume these stress patterns result from the dialect's optional weak prohibition on degenerate feet, which is stated in (106).

(106) *Weak prohibition on degenerate feet*
Foot parsing may form degenerate feet only in strong position—that is, when dominated by another grid mark.

Rule (106) says that degenerate feet are permitted only when dominated by a grid mark of the word layer and thus assigned stress. Degenerate feet which are not assigned a grid mark at the word layer are removed. According to Hayes, degenerate feet are formed when the foot parse leaves only enough material to form a degenerate foot. Thus, in a language in which feet are formed from right to left degenerate feet are predicted to be formed at the left edge, and in a language in which feet are formed from left to right (as in San'ani) the theory predicts that degenerate feet will be formed at the right edge. This accounts for the prepausal degenerate feet in words such as *yuxˈlaṭ* 'he mixes' and *ḥafˈlih* 'party'. The latter is exemplified in (107).

```
(107)                                        (     ×)
          (×)        →    (×)  (×)     →    (×)  (×)
        ḥ a f l i h ]    ḥ a f l i h ]      ḥ a f l i h ]
```

The foot parse creates a foot over the leftmost syllable; a degenerate foot is constructed from the remaining material. ERR assigns stress to the degenerate foot which survives to the surface by virtue of being dominated by a word layer grid mark.

In words which end in a consonant other than /h/, the degenerate foot may be repaired (i.e. made into a canonical foot) through vowel lengthening, as in *yuxla:ṭ* 'he mixes' and *aḥma:d* 'Ahmad' (see Section 5.1.2). In words which end in /h/—most notably the /h/ of the feminine suffix *-ih*—the vowel of the preceding foot is usually deleted when short, to add prominence to the stressed degenerate foot, as in *škmih* 'lunch party for parturient' and *ḥflih* 'party' (see Section 4.4.2.3).

In post-pause position, initial syllables are often stressed irrespective of their weight. I consider assignment of stress to an initial CV syllable in words with the template CVCVVC to be a further consequence of both the weak prohibition on degenerate feet in San'ani (see (61b)), and the analysis of CVVC as a single bimoraic syllable. If this analysis is correct, however, San'ani provides a counter-

example to Hayes's claim that degenerate feet are constructed at the right edge only when the direction of the foot parse is left to right, and at the left edge only when the direction of the foot parse is right to left. Hayes proposes that 'When candidates for degenerate foot status are encountered *other than* at the end of the parse, they are skipped over' (Hayes 1995: 95). San'ani, however, appears to construct degenerate feet not only at the end of the parse, but also at the beginning of the parse. The post-pause/pre-pause position is in mirror-image relation, and adjacency to pause is a crucial factor in the formation of degenerate feet in this dialect. In post-pause position, the initial syllable is placed in strong position irrespective of the structure of the following syllable. Consider the representation of *ˈtamām* 'okay'.

(108)

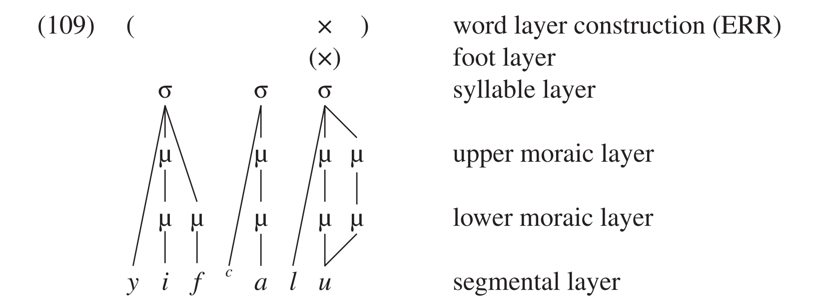
```
                                                  (×         )
   (×)   (×)      →      (×)  ⟨(×)⟩     →      (×)  ⟨(×)⟩
[ t  a  m  a: m       [ t  a  m  a: m        [ t  a  m  a: m
```

An initial degenerate foot is formed. The final CVVC syllable forms a second foot. The second foot is rendered extrametrical, and ERR assigns stress to the degenerate foot.

5.4.4.4 *Mora extrametricality*

A non-geminate verb in the imperfect aspect with a long vowel suffix is most likely to be stressed on the final CVV syllable, as in *yif^{c}aˈlū* 'they m. do' (cf. (8e)). In connected speech, however, the word can also be stressed on either of the other two syllables, as in *ˈyif^{c}alū* 'they m. do' and *yifˈ^{c}alū* 'they m. do'. The derivation of the predicted form, which depends on reference to the two-layer moraic grid, is repeated here for convenience.

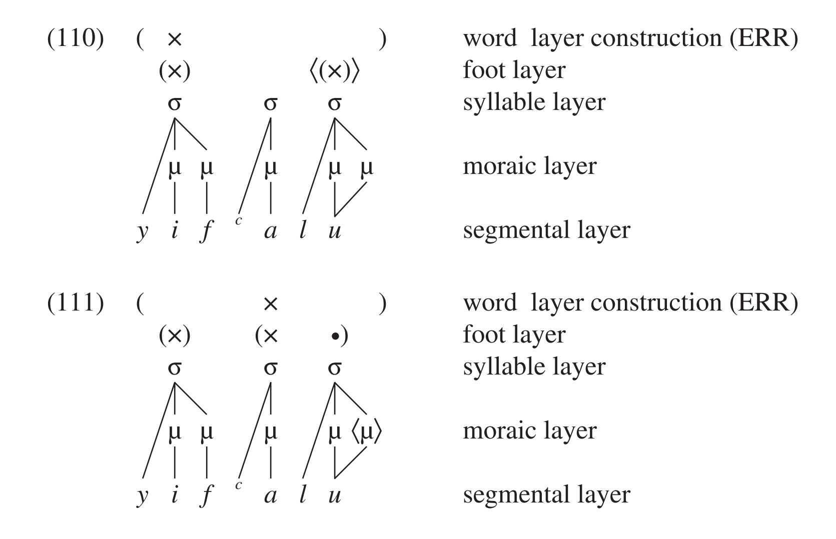
(109)



Neither of the alternative forms make reference to the two-layer moraic grid. The first alternative, *ˈyif^{c}alū*, is derived as in (110), with extrametricality of the peripheral foot.

In the second alternative, stress is assigned to the only light syllable in the word to give *yifˈ^{c}alū* 'they m. do'. Here mora extrametricality occurs rendering the final syllable of the word monomoraic. Foot construction creates a foot over the initial

heavy syllable and a second foot over the final two (now light) syllables. Foot extrametricality fails to apply. ERR assigns stress to the head of the rightmost foot, the penultimate syllable.



5.4.5 *Secondary stress*

In contrast to Cairene, San'ani exhibits secondary stress in words comprising two or more binary feet. Secondary stress is determined by a combination of the rhythmic principle and the stress algorithm: in a word with two binary feet, secondary stress is determined purely by the stress algorithm (that is, by foot construction): in a three/four-syllable word with a final CVVC syllable and a heavy syllable (CVV or CVG), either the final CVVC or the non-final CVV or CVG syllable receives main stress (subject to the application or non-application of foot extrametricality) while the other heavy syllable receives secondary stress (in the following diagrams only the heads of binary feet are marked):

(112) (a)

×		word layer
×	⟨×⟩	foot layer
x a: r i	*j i: n*	segmental layer

or (b)

	×	word layer
×	×	foot layer
x a: r i	*j i: n*	segmental layer

In a word with a simple CVC heavy syllable and a penultimate CVV syllable, main stress will be assigned to the penultimate CVV syllable, while secondary stress is

assigned to the simple heavy syllable (CVC), to give *ˌyiḏbaˌḥūhin* 'they m. slaughter them f.' (where ˌ denotes a following secondarily stressed syllable):

(113)

					×					word layer
	×				×					foot layer
y	*i*	*ḏ*	*b*	*a*	*ḥ*	*u:*	*h*	*i*	*n*	segmental layer

In words with two disyllabic binary feet, such as *katabatih* 'she wrote it m.' and *darasatih* 'she learnt it m.', main stress and secondary stress are determined by the stress algorithm, and fluctuations are accounted for by the optionality of foot extrametricality. Main stress is assigned to the initial syllable if foot extrametricality holds, with secondary stress on the penultimate syllable to give an alternating *S w s w* pattern. When foot extrametricality does not hold, the pattern is reversed and main stress is placed on the penultimate syllable with secondary stress on the initial syllable to give *s w S w*, as in (114).

(114) *ˈkataˌbatih* 'she wrote it' or *ˌkataˈbatih* 'she wrote it'
ˈfa^{c}*iˌlatih* 'his problem' or *ˌfa*^{c}*iˈlatih* 'his problem'
ˈdaraˌsatih 'she learnt it' or *ˌdaraˈsatih* 'she learnt it'

The alternative stress patterns of *katabatih* 'she wrote it m.' are given in (115).

(115) (a)

	×								word layer
	×			⟨×		• ⟩			foot layer
k	*a*	*t*	*a*	*b*	*a*	*t*	*i*	*h*	segmental layer

or (b)

					×				word layer
	×				(×		•)		foot layer
k	*a*	*t*	*a*	*b*	*a*	*t*	*i*	*h*	segmental layer

In words with four binary feet, a further supra-foot, sub-word rhythmic level determines the location of secondary stress by creating a sequence of stressed and unstressed feet. In a word such as *musˌtašfaˈyāt* 'hospitals', in which primary stress is invariably assigned to the rightmost foot, secondary stress is assigned to the penultimate foot. In a word such as *tiliviziyūnāt* 'televisions' with final and penultimate long vowels, secondary stress is assigned to the head of the leftmost foot if primary stress is located on the penultimate foot, as in (116a). If primary stress is assigned to the rightmost foot due to the failure of foot extrametricality, secondary stress is assigned to the head of the antepenultimate foot, as in (116b).

(116) (a)

								×				word layer
	×							×				rhythmic layer
	(×		•)		(×		•)	×		⟨×⟩		foot layer
t	*i*	*l*	*i*	*v*	*i*	*z*	*i*	*y*	*u:*	*n*	*a:* *t*	segmental layer

(b)													
											×		word layer
					×						×		rhythmic layer
	(×		•)		(×		•)				×		foot layer
t	*i*	*l*	*i*	*v*	*i*	*z*	*i*	*y*	*u:*	*n*	*a:*	*t*	segmental layer

In Cairene there is no rhythmic level and foot construction appears to serve purely as a computational device—it is crucial to determine main stress placement, but the feet are not reflected in secondary stress (cf. Hayes 1995: 119). For Cairene either the phonetic and phonological rules do not provide any means of manifesting foot structure, or feet are removed by a phonological rule which Halle and Vergnaud term 'conflation' (Halle and Vergnaud 1987: 50). Halle and Kenstowicz (1991: 462, repeated in Hayes 1995: 119) provide the following version of conflation:

(117) *Conflation*
Remove the lowest line of the grid

5.5 CONCLUSION

In this chapter I have examined the word-stress systems of Cairene and San'ani. Both dialects are independently demonstrated to have moraic trochee systems. Differences between stress assignment in Cairene and San'ani are partially attributable to the fact that Cairene lacks foot extrametricality. Cairene also invariably assigns stress to the penultimate syllable when the perfect verb in the {third person feminine singular} inflectional form takes an object suffix and in the case of plurals of the patterns CiCiCa and CuCuCa. I argue that these exceptional stress patterns are lexicalized and not derivable from the rules given in (45), and conjecture that they are a vestige of an earlier stage in the development of Cairene. Further differences between the San'ani and Cairene stress sytems are attributed to a prosodic difference in San'ani between CVC syllables and CVG/CVV syllables; to stress fluctuation in San'ani brought about by the optional failure of foot extrametricality in connected speech, stress migration within the foot, a weak prohibition on degenerate feet and optional mora extrametricality; and to a lack of secondary stress in Cairene.

I have concentrated on word stress in San'ani for two reasons. First, in phonological literature far less is known about word stress in San'ani than in Cairene; and secondly, San'ani poses more challenges for a theory about word stress than most other modern dialects of Arabic, particularly in terms of the privilige of word-internal CVV and CVG syllables, and the degree of attested fluctuation of stress in connected speech.

6

MORPHOLOGY

Morphology deals with the way in which words are constructed. Morphology also accounts for morphological variation—that is, allomorphy. Within a phonological framework, morphology is important insofar as certain phonological rules are sensitive to morphological structure and are restricted to applying within specific derived morphological domains, while other phonological rules are insensitive to morphological structure. For example, coronal plosive voicing in San'ani requires no morphological specification and applies whenever a coronal plosive occurs in intervocalic or word-initial position (see Section 9.2.7).

(1)	*/ṭālib/*	[*ḍ*]*ālub*	'student m.'
	/bi-tuktub/	*bi-*[*d*]*uktub*	'you m.s./she are/is writing'
	/kātib/	*kā*[*d*]*ib*	'writer m.'

Similarly, geminate voiced nonsonorant stops are devoiced in San'ani irrespective of whether the geminate is derived (as in the last two examples) or underlying:

(2)	*/ḥagg/*	*ḥa*[*kk*]	'right'	
	/ḥajj/	*ḥa*[*t:š*]	'pilgrimage'	
	/ḏubbī/	*ḏu*[*pp*]*ī*	'fly'	
	/al + dāyir/	*> ad-dāyir >*	*a*[*t-t*]*āyir*	'the key'
	/dtarab/	*> iddarab >*	*i*[*tt*]*arab*	'he fell'

By contrast, in both Cairene and San'ani, the anticipatory assimilation of /l/ to a coronal obstruent (and optionally to a velar plosive in Cairene) occurs only where /l/ belongs to the definite article (*il-* in Cairene, *al-* in San'ani) (see also Section 8.2.2).

(3)	(a)	CA	*/il + siggāda/*	*is-siggāda*	'the carpet'
			/il + tīn/	*it-tīn*	'the figs'
			/il + ṭifl/	*iṭ-ṭifl*	'the child'
			/il + zēt/	*iz-zēt*	'the oil'
			/il + gaṛas/	*ig-gaṛas ~ il-gaṛas*	'the bell'
			/il + kilma/	*ik-kilma ~ il-kilma*	'the word'
		cf.	*/il + bint/*	*il-bint*	'the girl'
			/il + mudarris/	*il-mudarris*	'the teacher'
	(b)	SA	*/al + sayl/*	*as-sayl*	'the flood', 'rain'
			/al + šams/	*aš-šams*	'the sun'

	/al + tīn/	*at-tīn*	‘the figs’
	/al + dīn/	*ad-dīn*	‘the religion’
	/al + ẕiyārih/	*aẕ-ẕiyārih*	‘the visit’
	/al + ḏibāḥah/	*aḏ-ḏibāḥah*	‘the slaughter’
	/al + ṯānī/	*aṯ-ṯānī*	‘the second’, ‘next’
cf.	*/al + bayt/*	*al-bayt*	‘the house’
	/al + ^{c}iyyāl/	*al-^{c}iyyāl*	‘the children’

When /l/ and a contiguous coronal obstruent (or velar plosive in Cairene) belong to the same morpheme—that is, to the consonantal root—assimilation does not take place, as in the examples in (4).

(4)

Cairene		*San’ani*	
malsū^{c}	‘jumpy’	*jalsih*	‘sitting’
maldū^{c}	‘son of a bitch’	*jild*	‘leather’
malṭūš	‘filched’	*alṭaf*	‘nicer’
talṣīma	‘temporary fixing job’	*ṣalṣuh*	‘sauce’
malkūm	‘punched’	*ṯulṯ*	‘third’
		malḏū^{c}	‘spicy’, ‘sharp’

Similarly, when a coronal obstruent (or a velar plosive in Cairene) is preceded by /l/ from any morpheme other than the definite article, anticipatory assimilation does not take place. (5a) provides examples of initial root /l/ followed by infix *-t-* of the verbal form VIII; (5b) provides examples of final root /l/ followed by a consonant-initial suffix.

(5) (a)

Cairene		*San’ani*	
iltihāb	‘swelling’	*iltifāt*	‘turning round’
iltimās	‘request’	*iltibāj*	‘coming to blows’

(b)

Cairene		*San’ani*	
^{c}amalt	‘I/you m.s. did/made’	*fi^{c}ilt*	‘I/you m.s. did/made’
^{c}amalna	‘we did/made’	*fi^{c}ilnā*	‘we did/made’
ma ^{c}amalš	‘he didn’t do/make’	*mā fi^{c}ilš*	‘he didn’t do/make’
ʔibilku	‘he accepted you pl.’		

This interaction between the morphology and the phonology can only be represented by a theory which takes into account the morphological structure of words and which states, as part of its tenets, that certain phonological processes only apply in specific derived environments. Thus, the total anticipatory assimilation of /l/ to a coronal obstruent (or velar plosive in Cairene) only occurs when /l/ belongs to the definite article, and in no other case. In order to appreciate the role of morphology within the phonology of Arabic, we need to posit a satisfactory description of Arabic morphology. This is the aim of this and the following chapter.

6.1 THE MORPHEME

The basic unit of morphology is the morpheme. Languages differ in the means by which morphemes are linked into words. In isolating languages such as Classical Chinese, a sentence comprises a sequence of monosyllables, each of which is a grammatical unit and few are divisible into smaller units of the same kind (Matthews 1991: 206). Such a language could be said to have no morphology, since all morphology is reducible to the domain of syntax. The morphological systems of many other languages in which words are clearly divisible into morphemes can be predominantly seen as word-syntax. That is to say, morphemes can be added as prefixes or suffixes to a basic stem. In this type of system, each individual morpheme can usually be identified as an isolatable whole, even where sounds at morpheme boundaries may have changed. On the whole, this is the case with English. Consider the morphological composition of the following words (morphemes delineated by square brackets):

(6) (a) $[\text{sense}]_{\text{n.}}[\text{less}]_{\text{neg.adj.}}[\text{ness}]_{\text{n.}}$
(b) $[\text{un}]_{\text{neg.}}[\text{believ}]_{\text{v.}}[\text{able}]_{\text{adj.}}$

In (6a) the stem of the word is the noun [sense]; the morpheme [less] negates [sense] and converts it into an adjective; the morpheme [ness] then converts the adjective [senseless] back into a noun. In (6b) the stem of the word is the verb [believe]; the morpheme [able] converts [believe] into the adjective [believable]; the morpheme [un] then negates the positive adjective [believable], but does not affect the syntactic class of the word.

However, even in languages which have a predominantly agglutinative morphological system, it is not always possible to isolate the separate morphemes of what appears to be a morphologically complex word. In English, a number of plurals are created by ablaut—by changing one of the vowels of the singular, as in (7).

(7)

Singular	Plural
man	men
woman	women

Ablaut also occurs with verb forms in English. The word *took* comprises the verb [take] plus the vowel [u] to represent past tense (Spencer 1991: 49–50). There are a large number of other exceptions to the agglutinative morphology of English, some of which come from old loan words: the nouns [goose], [tooth], and [foot] all take a vestige of earlier German umlaut in the plural to give *geese*, *teeth*, and *feet*. These are the only three items in the lexicon which have this umlaut; therefore the roots themselves have to be marked with a diacritic to trigger ‘umlaut’ in the plural (Spencer 1991: 101).

6.2 ROOT-AND-PATTERN MORPHOLOGY

In some languages, a great deal more morphological categories are expressed by morphemes which, like the 'umlaut' and ablaut examples in English, are not easily isolatable into separate phonological forms. In these languages, morphological categories are expressed by morphemes whose only constant is a fixed canonical pattern. The most common morphological process of this type is reduplication, which is attested in a large number of the world's languages (Spencer 1991: 150–6). In reduplication, part or whole of a basic stem is reduplicated and may be prefixed, suffixed or infixed in the stem to produce a derived word. In Palan Koryak (Žukova 1980: 42–3, cited in Spencer 1991: 150), the first CVC unit of the word is reduplicated and suffixed in the reduplicated word:

(8) (a)

Stem	*Reduplicated word*	*Gloss*
wiru	wiru-wir	'seal'
liŋ	liŋ-liŋ	'heart'
jiŋe	jiŋe-jiŋ	'mist'

In Samoan (Broselow and McCarthy 1983: 30, cited in Spencer 1991: 151, 154–5), the initial consonant and first mora of the metrical foot is reduplicated and prefixed to the first consonant of the foot:

(b)

Stem	*Reduplicated word*	*Gloss*
taa	ta-taa	'strike'
nofo	no-nofo	'sit'
alofa	a-lo-lofa	'love'
maliu	ma-li-liu	'die'

More complicated than reduplication is the Semitic templatic root-and-pattern morphology of content words (nouns, adjectives, and verbs) and non-minimal prepositions and adverbs (as in Arabic ^{c}*ind* 'at, with', ^{c}*alā* 'on, against', *ʔayḏ̣an* 'also', *jiddan* 'very'). In these languages, various morphological distinctions are expressed by specifying a fixed canonical form (a pattern) of the stem which does not vary irrespective of the quality of the root consonants or the intercalated vowels. The root-and-pattern morphology of Arabic is most commonly described using examples of derivational verbs. The triliteral verb form II, which often imposes a causative or intensive sense on the basic form I verb, has the stem pattern CVCCVC with a geminate middle radical. In Standard Arabic, the imperfect is formed by changing the quality of the rightmost stem vowel and adding an imperfect prefix (*ʔu-* {first person singular}, *yu-* {third person masculine}, *tu-* {second/third feminine singular}, *nu-* {first person plural}). The passive is formed by a change in the vocalic melody.

(9)	ROOT >	/d-r-s/	/r-k-b/	
		darras	*rakkab*	perfect active
		durris	*rukkib*	perfect passive
	ʔu/yu/tu/nu+	*darris*	*rakkib*	imperfect active
	ʔu/yu/tu/nu+	*darras*	*rakkab*	imperfect passive

6.3 NON-CONCATENATIVE MORPHOLOGY

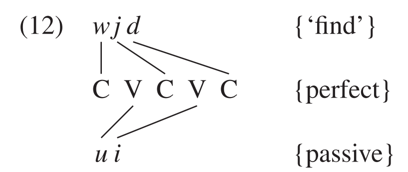
The stem of a content word in Arabic has three discontinuous morphemes: the consonantal root, which is the fundamental lexical unit of the language (McCarthy and Prince 1990*a*: 2); the templatic pattern into which the consonantal root is inserted imposing an additional meaning to that of the root; and the intercalated vowels—the vocalic melody—which mark variations in, for example, the voice (active or passive) in verbs, agentive relations in nouns derived from verbs, and singular–plural relations in nouns. In short, the Arabic lexicon comprises the morpheme types in (10), the first three of which are present in basic stems (cf. Section 6.4.2; Moore 1990: 64).

(10) (a) Templates: the bare prosodic material.
(b) Roots: the consonantal melody units.
(c) Vocalism: the vocalic melody units.
(d) Affixes: which may consist of both prosodic and melodic units.

Traditional analyses of morphology in which words are decomposed into a series of internal boundary elements that delimit the constituent morphemes are unable to account for the discontinuous morphemes attested in Semitic languages. McCarthy (1981) proposes that, on analogy with autosegmental phonology, each morphological unit is linked by lines of association to some of the phonological material in the form. The morpheme is usually represented as μ on the morphemic tier. In early Nonconcatentive Morphology, the basic templatic pattern of a word is represented by a sequence of empty timing tier entities notated as Cs and Vs (cf. Section 4.1); the consonantal root as a sequence of consonants; and the vocalic melody as a sequence of vowels. Association of melody elements with elements of the skeletal template is restricted by the Universal Association Convention of phonology, repeated from Section 4.1 for convenience:

(11) *Universal Association Convention*
Associate autosegments and autosegment-bearing units one to one, left to right.

The UAC ensures that elements of the consonantal root and the vocalic melody associate on a one-to-one basis from left to right to appropriate elements of the skeletal template. San'ani *wujid* 'he/it m. was found' comprises the consonantal root /w-j-d/, the passive vocalic melody /u-i/, and the skeletal template of the perfect aspect, CVCVC, as in (12).

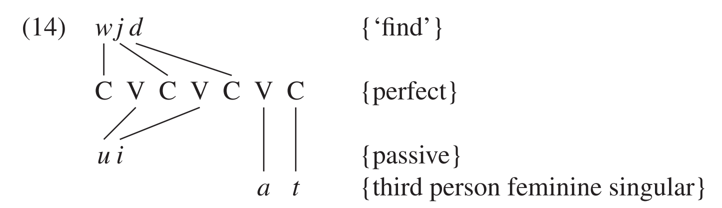
(12)


In order to arrive at a pronounceable string of segments, the morphological tiers are linearized by a process known as Tier Conflation (McCarthy 1986, after Younes 1983), through which the C and V melodies are folded onto a single tier:

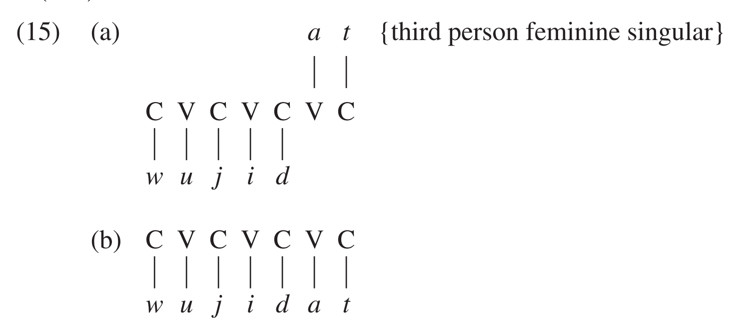
(13) C V C V C
| | | | |
w u j i d

The combination of the morphemes {'find'}, {perfect}, and {passive} with no additional information for person gives the form *wujid* 'he/it m. was found'.

In contrast to stems, affixes are represented as combined prosodic and melodic units with the consonants and vowels on the same tier since there is no evidence for the separation of Cs and Vs in affixes (cf. Spencer 1991: 148). Thus, the underlying representation of San'ani *wujidat* 'she/it f. was found' is in (14).



In a phonological word comprising a stem and affix(es), a pronounceable linear string of segments is reached by Tier Conflation operating first to fold together Cs and Vs of the stem, as in (15a), and then to fold in the remaining affixes, as in (15b).



Association is subject to the Obligatory Contour Principle (OCP), initially proposed by Leben (1973) to deal with problems of tonal specification and reformulated by McCarthy (1979*a*, 1981, 1986) to deal with general tier-internal representations:

(16) *Obligatory Contour Principle*
In a given autosegmental tier, adjacent autosegments are prohibited.

Successive specification of identical elements is banned by the OCP: in stems ending in two identical adjacent consonants such as San'ani *ḥagg* 'right, possession, belonging to', the consonantal melody is given as /ḥg/. In stems with two identical vowels, as in *katab* 'he wrote', the vocalic melody is given as a single vowel, /a/. Association of the melody with the skeletal template takes place from left to right on a one-to-one basis in accordance with the UAC; where the number of templatic positions exceeds the number of melodic elements, the rightmost element of the melody spreads rightwards to fill any unfilled templatic positions (cf. Section 4.1). The representation and association of *ḥagg* 'right, possession' is as in (17).

```
(17)  ḥg              {'right', 'possession'}
      | \ ` ` .
      C V C C         {noun}
        |
        a             {singular}
```

The representation and association of *katab* 'he wrote' is as in (18).

```
(18)  k t b           {'write'}
      | \  \
      C V C V C       {perfect}
        | . ' 
        a             {active}
```

In contrast to the consonantal melody, the vocalic melody is only partially independent of the template and the consonantal melody: /u-i/ marks the passive voice in the perfect aspect in Standard Arabic and San'ani; however, in other cases, a particular vocalic melody is associated with a particular template: CVVCVC participles and plurals of the patterns CVCVVCV(V)C take the melody /a-i/, nouns of instrument of the template mV+CCVVC the melody /i-a/ (/u-a/ in Cairene); and in nouns of the template CVCC, the vocalic melody is lexically stipulated, /a/, /u/, or /i/, as exemplified in the San'ani words *ḥagg* 'right', *gufl* 'lock', and *tibn* 'straw' (cf. Kenstowicz 1994: 636).

6.4 PROSODIC MORPHOLOGY

In recent years, work in phonology has demonstrated that there was little or no evidence for the segment-sized units of CV or X-slot skeleton theory (McCarthy and Prince 1990*a*: 5). Evidence did, however, clearly remain for templatic patterns to deal with both reduplication in languages and non-concatenative morphological systems. Building on work from Prosodic Phonology (Selkirk 1980, among others), McCarthy and Prince (1986, 1988, 1990*a*, 1990*b*) developed a model of

Prosodic Morphology within which they demonstrate that the categories relevant for templatic morphology are precisely those made available by prosodic theory in general, including the mora, the syllable, the foot, and the phonological word (Hayes 1995: 47). This meant that the notions applicable to the templates were now identical to those notions applicable to prosody in general—including stress, syllabification, epenthesis, compensatory lengthening, rhyme, and poetic metre (McCarthy and Prince 1990*a*: 3). The three fundamental theses of Prosodic Morphology are summed up in (19).

(19) (a) Prosodic Morphology Hypothesis. Templates are defined in terms of the authentic units of prosody: mora (μ), syllable (σ), foot (F), phonological word (ω), and so on.
(b) Template Satisfaction Condition. Satisfaction of templatic constraints is obligatory and is determined by the principles of prosody, both universal and language-specific.
(c) Prosodic Circumscription of Domains. The domain to which morphological operations apply may be circumscribed by prosodic criteria as well as by the more familiar morphological ones. In particular, the minimal word within a domain may be selected as the locus of morphological transformation in lieu of the whole domain (McCarthy and Prince 1990*b*: 209–10).

The prosodic template is read in terms of the Prosodic Hierarchy in (20) (from Selkirk 1980).

(20) *Prosodic Hierarchy*

Phonological Word	ω
Foot	F
Syllable	σ
Mora	μ

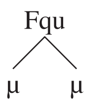
The Prosodic Hierarchy is read from top to bottom such that each higher element contains at least one unit from the element immediately below: thus, the minimal phonological word comprises a foot, the minimum foot comprises a syllable, and the minimum syllable comprises a mora. The phonological word (ω) usually, but not necessarily, coincides with the syntactic word (cf. Section 4.4).

6.4.1 *The minimal word*

Since the word dominates the foot in the prosodic hierarchy, the minimal word will be a single foot: in a quantitative trochaic stress system as exhibited by Cairene and San'ani, the minimal word is a quantitative (moraic) foot.[1]

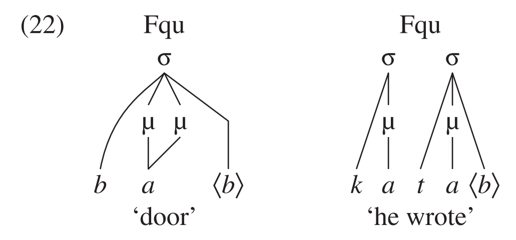
[1] In iambic systems, the minimal word will be the *minimal* iamb, i.e. any iamb which satisfies foot binarity. No language can demand a minimal word comprising a light followed by a heavy syllable (McCarthy and Prince 1995: 323).

(21) *Minimal word*



Since (21) is expressed in terms of moraic content and not in terms of syllables, the minimal word is predicted to comprise either a single bimoraic syllable, or a sequence of two monomoraic syllables (cf. Section 5.2.2), as in (22).

(22)



6.4.2 *Basic stems*

The word stem is an important concept in Arabic, and will be referred to several times during the course of this and the following chapters. The stem is defined here as the bare word prior to the affixation of any suffixes or prefixes, but after any stem-internal changes. For example, *katabat* 'she wrote' comprises the stem *katab* and the subject marker suffix *-at*; *ummak* 'your m.s. mother' comprises the stem *umm* and the possessive pronoun suffix *-ak*; San'ani *yibsirak* 'he sees you m.s.' comprises the stem *bsir*, the subject marker prefix *yi-* and the object suffix *-ak*; and San'ani *taḥammam* 'he bathes' comprises the stem *ḥammam* and the form V/VI detransitivizing prefix *ta-*.[2] Within the Prosodic Hierarchy, the stem comes between the foot and the phonological word. However, the stem may not be independently syllabifiable, as in the case of the stem of *yibsirak* 'he sees you m.s.'.

An important prediction of Prosodic Morphology is that the basic stems of content words in Arabic will comprise complete feet—at least one foot and at most two feet. Therefore the composition and size of the basic stem is ruled by a combination of two constraints: the Minimal Word Constraint, which ensures that the minimal stem is bimoraic (see Section 6.4.1), and the language-specific Maximal Stem Constraint (McCarthy and Prince 1990*a*: 25), stated in (23).

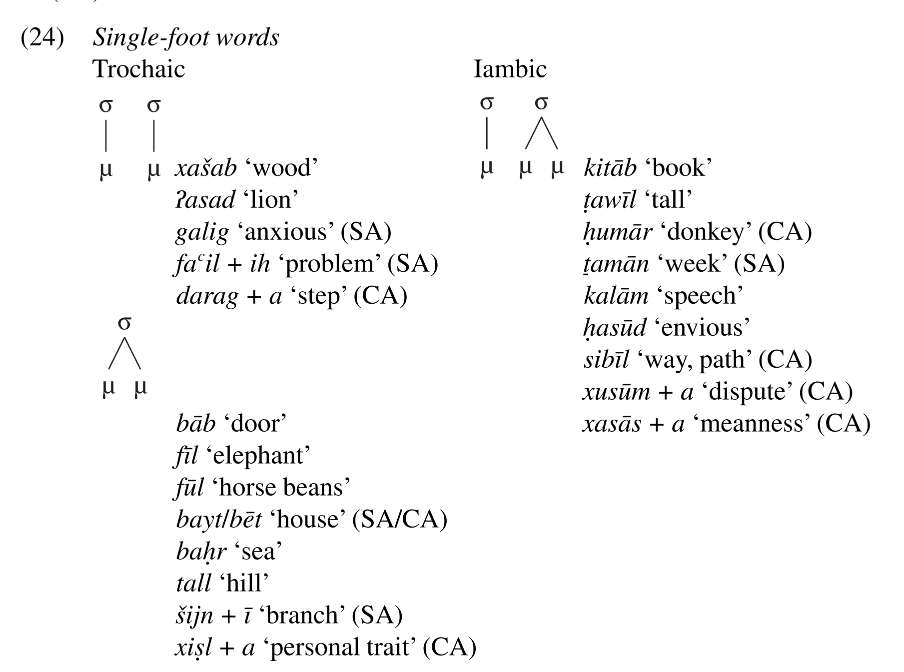
(23) *Maximal Stem Constraint*
Templates are maximally disyllabic.

While the stress systems of Cairene and San'ani are trochaic (see Section 5.2.2), a large number of basic single-foot words are based on the canonical iambic foot—a

[2] In modern Arabic dialects, the {third person masculine singular} form of the perfect verb is usually isomorphic with the perfect stem. Thus, *katab* 'he wrote' is the same as the stem of *katabat* 'she wrote', and San'ani *gambar* 'he sat' the same as the stem of *gambarayn* 'they f. sat'.

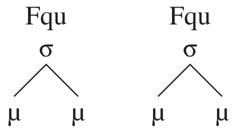
light (monomoraic) syllable followed by a heavy (bimoraic) syllable. Two morphological processes are also based on the iambic foot: the diminutive and the most productive broken plural patterns (cf. Section 6.6).

The following nominal stem-types are attested in the Arabic dialects under discussion (cf. McCarthy and Prince 1990*a*: 32 for Standard Arabic). A word which is exclusive to either Cairene or San'ani is followed by the abbreviation (CA) or (SA).



Basic nominal stems may comprise two trochaic feet, particularly in the case of quadriliteral roots.

(25) *Double-foot words*



Examples: *ṣābūn* 'soap' (SA), *bābūr* 'lorry' (SA), *gāmūs* 'dictionary' (SA),[3] *kabrīt* 'sulphur' (CA), *kartūn* 'cardboard' (CA), *ᶜuṯmān* '[male name]', *nuwwār* 'blossom', *sulṭān* 'sultan', *badrūm* 'cellar' (SA), *ḥifḥāf* 'barking' (SA).

[3] A large number of nouns on the *fāᶜūl* template are originally loan words from a non-Arabic source. In Cairene, these are realized as *faᶜūl* with shortening of the unstressed long vowel (see Section 9.1.1).

Words which comprise more than one foot but less than two, such as the form I active participle and the stem of the form III verb, which share the template CVVCVC, are shown by McCarthy and Prince to be derived from the basic form I verb template, CVCVC, by prefixation of a mora, lengthening the initial vowel (McCarthy and Prince 1990*a*: 29, 1990*b*: 262). CVVCVC words are analysed as a trochaic foot plus a degenerate foot—a monomoraic syllable. The derivation of CVVCVC words will be discussed further below.

Following Ratcliffe (1990), I assume that Arabic has two morphological levels. Level one, which affects the stem of the word predominantly, can be said to correspond roughly to the non-concatenative (or infixal) morphology; and level two, which does not affect the stem of the word, works predominantly by adding affixes to the beginning and end of the word stem. As a working hypothesis, level-one morphology is roughly equivalent to derivational morphology, and level-two morphology to inflectional morphology. However, some level-two affixes change the class membership of the word from adjective to noun, or from noun to adjective and therefore appear to be part of the derivational morphology. At both morphological levels, the Prosodic Morphology Hypothesis predicts that morphological processes will apply to, and involve, authentic units of prosody (the mora, the syllable, the foot, or the phonological word).

In this chapter I discuss the level-one morphology of Cairene and San'ani. I begin by discussing the verbal morphology, establishing the basic verbal templates and then the derivative templates, including nominal deverbal derivatives. Under level-one nominal morphology I consider the formation of various broken plural types in the dialects.

Level-one morphological processes predominantly affect the stem. In a few cases, a level-one process involves a prefix or suffix in addition to a change in the stem template or the vocalic melody. In all cases, level-one processes occur prior to level-two processes. Level-one processes include the derivation of the internal passive (in Standard Arabic and San'ani), triliteral verb forms II to X (II to XV in Standard Arabic), quadriliteral verb form II, verbal derivatives including the active participle, the passive participle, the *faᶜlān* adjective in Cairene, nouns of instrument and place, and verbal nouns of derived verb forms; in the nominal morphology, level-one processes include the formation of broken plurals and diminutives and the elative. In the dialects, I assume that certain derived templates are the result of historical derivations which have since become lexicalized. These include most of the derived triliteral verbal templates, since new verbs are formed on very few templates. For San'ani, lexicalized derived verbal templates include triliteral forms III, IV, VII, VIII, and, possibly, VI and X. Triliteral forms II and V and the quadriliteral forms I and II are still actively derived. In Cairene, lexicalized derived verbal templates include triliteral forms III, IV, VI, VIII, IX, and X. Triliteral forms II, V, and VII and the quadriliteral forms I and II are still actively derived. Additional forms involving the prefix *sti-/sta-* are at least semi-active: many of these forms are restricted to uneducated speech or are stigmatized, and *sti-* is pre-

fixed to recently-derived quadriliteral verbs, as in *stiʔamrik* 'to ape the Americans'. In Section 6.5 I consider the derivation of triliteral verbal forms II to X, some of which I assume to be historical.

6.5 LEVEL-ONE VERBAL MORPHOLOGY

The canonical pattern of the Arabic verb is far more restricted than that of the noun: with the exception of biliteral verbs (which I deal with below) and form IX, verbal stems are disyllabic in both dialects and end in a light syllable (CVC). Differences between the dialects are attested insofar as certain templates are rare in one or other dialect and form IX, indicating colour or defect, is attested only in Cairene:[4] in San'ani, as in many other eastern dialects, the function of form IX has been taken over by form II. Very few modern dialects have forms above X. A few North African dialects use form XI for colours and defects, as exemplified by *ḥmār* 'to become red' attested in the dialect of the Algerian Jews (Fischer and Jastrow 1980: 69), and Cairene has forms (relatively infrequently attested[5]) which involve the prefixation of *sti-* or *sta-* to forms II and III to give *stifa*^{cc}*il*, *stafa*^{cc}*il*, and *stifā*^{c}*il* (Cuvalay-Haak 1997: 110). Form IV is rare in all modern dialects of Arabic (Fischer and Jastrow 1980: 70), but more common in San'ani than in Cairene. Due to the weakness of the initial non-radical glottal stop in form IV *ʔaf*^{c}*al*, several form IV verbs have been adapted to a form I pattern,[6] or replaced by a form II verb (Fischer and Jastrow 1980: 46; Cuvalay-Haak 1997: 109). Original form VII (*n* + I) has been replaced by *t* + I in Cairene as the productive means of forming the passive of form I. *n* + I is attested for very few roots in San'ani (Rossi 1939; Retsö 1983: 147) and *t* + I does not exist. This state of affairs is partly due to the fact that San'ani retains the apophonic passive for some roots whereby passives are produced by the vocalic melody /u-i/ or /i-i/ in the perfect and /u-a/ in the imperfect (see Section 6.3; Watson 1993*b*: 91),[7] and partly due to the fact that San'ani uses form VIII

[4] Badawi and Hinds (1986) include at least 13 form IX verbs which indicate neither colour or defect.

[5] Badawi and Hinds (1986) include at least 32 *sti-/sta-* + II verbs and four *sti-/sta-* + III verbs. *Sti-/sta-* + II/III forms are found in other dialects including Jerusalem, Damascene, and Muslim Tunisian (Fischer and Jastrow 1980: 71).

[6] In the Yemeni dialect of Ibb, *ʔa*^{c}*jab* 'to please' has been adapted to the form I pattern to give ^{c}*agab*. Cairene has both form IV and form I patterns of this verb. Of these, form IV is more prestigious. As an active participle, the form I participle ^{c}*āgib* is used and not *mu*^{c}*gib*. In Cairene, the historical adaptation of a closed set of form IV verbs to form I has led to a set of transitive verbs with the vocalic melody /a/ which contrast with form I intransitive verbs with the vocalic melody /i/ (see Section 1.3).

[7] Internal passives in San'ani are slightly more common in the imperfect than in the perfect (Watson 2000: 86; cf. Holes 1998 for Gulf dialects). Forms such as *hāḏā yuʔkal* 'this can be eaten' and *xaṭṭ yugrā* 'readable writing' are more common than *ʔukil* and *gurī*. Internal passives in the perfect are regularly found, however, for certain roots, as in: *wulid* 'he was born', *kumil* 'it m. was completed', *gutil* 'he was killed', *hāḏā ʔawwal ṭarīg zufliṭat* 'this is the first road to be asphalted', *wujid* 'it m. was found', *summiyat* 'she was called'.

(infix /t/) to derive passives of form I from other roots (e.g. *ḥabas* 'to imprison', *ḥtabas* 'to be imprisoned'; *bā*^{c} 'to sell', *btā*^{c} 'to be sold'). The infix /t/ is also used in at least one case to derive a passive verb from a denominal verb, namely *magaṣṣ* 'to cut with scissors' (cf. *magaṣṣ* 'scissors'), which is passivized as *mtagaṣṣ* 'to be cut with scissors'.[8] While form VIII is very common in San'ani, it is relatively rare in Cairene.

Of the nine derived triliteral verb forms (eleven in Cairene if *sti/sta* + II and *sti/sta* + III are counted as separate forms), form II is the most frequently attested in both dialects. It is the most productive form today (most loan verbs are constructed on this pattern), and is much more frequent in modern Arabic dialects in general than it is in either Classical or Modern Standard Arabic (Cuvalay-Haak 1997: 109). In the table of triliteral verb forms in (26), the traditional symbols /f-^{c}-l/ denote the three root consonants.

(26) *Triliteral verb forms*

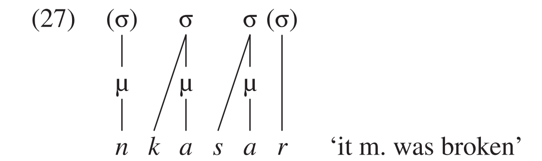
	SA	CA
I	*fa*^{c}*al* ~ *fi*^{c}*il* ~ *fu*^{c}*ul*	*fa*^{c}*al* ~ *fi*^{c}*il* ~ *fu*^{c}*ul*[9]
II	*fa*^{cc}*al*	*fa*^{cc}*al* ~ *fa*^{cc}*il*
III	*fā*^{c}*al*	*fā*^{c}*il*
IV	*ʔaf*^{c}*al*	*ʔaf*^{c}*al* (rare in CA)
V	*tifa*^{cc}*al* ~ *tafa*^{cc}*al*	*tfa*^{cc}*al* ~ *tfa*^{cc}*il*
VI	*tifā*^{c}*al* ~ *tafā*^{c}*al*	*tfā*^{c}*il*
VII	*nfa*^{c}*al* (rare in SA)	*tfa*^{c}*al* ~ *nfa*^{c}*al*
VIII	*fta*^{c}*al*	*fta*^{c}*al* (relatively rare in CA)
IX	NA	*f*^{c}*all*
X	*staf*^{c}*al*	*staf*^{c}*al*
		stafa^{cc}*il* ~ *stifa*^{cc}*il*
		stafā^{c}*il* ~ *stifā*^{c}*il*

Unlike canonical nouns, the verb forms V–X in Cairene (VII–X in San'ani, with a few V and VI instances) have initial consonant clusters which are syllabified by prosthesis. For Standard Arabic, McCarthy and Prince analyse the initial consonant of the cluster as linked to an incomplete syllable (McCarthy and Prince 1990*a*: 39), which mirrors their analysis of the stem-final extrametrical consonant linked to a final incomplete syllable.[10] While final C functions as the onset to an incomplete syllable, initial C is moraic—see (27).

[8] In other dialects of Yemeni Arabic, including Ibbi, form VIII is the most productive means of deriving the passive from a form I active verb, as in: *ktatab* 'to be written' (*katab* 'to write'), *staraq* 'to be stolen' (*saraq* 'to steal'), *štarab* 'to be drunk (drink)' (*širib* 'to drink'), *xtabaz* 'to be baked' (*xabaz* 'to bake').

[9] *fu*^{c}*ul* is rare in Cairene today. It appears to have been considerably more common in nineteenth-century CE Cairene (Woidich 1995: 279).

[10] An incomplete syllable is not the same as an extraprosodic syllable. I assume that domain-final consonants in CVC syllables are extrametrical and associate directly with the syllable node of the preceding syllable at the end of the derivation.

(27)


'it m. was broken'

Evidence for the moraicity of this initial C is seen in the syllabification of the C to the right of a prosthetic vowel in dialects which do not allow consonant clusters in syllable-onset position. Consider the examples from Cairene in (28).

(28)	post-pause	*ʔinkasar*	'it m. was broken'
	post-consonantal	*il-ʔalam inkasar*	'the pen was broken'
	post-vocalic	*wi-nkasar*	'and it m. was broken'

Epenthesis typically occurs in both dialects after an extrametrical consonant (cf. Section 4.4.1.1)—and therefore would be expected to occur after and not before the initial C in these derived verb forms if the initial C were extrametrical. Loan words with initial consonant clusters in the source language, for example, are typically syllabified in both dialects by epenthesis to the right of the extrametrical consonant, as in the examples in (29) of English loan words in Cairene and San'ani.

(29)	CA		SA	
	b(i)lastik	'plastic'	*b(a)ristaw*	'pressure cooker' [Eng. 'Presto']
	k(u)lubb	'globe'	*j(a)likaws*	'Glucose [biscuits]'
	k(i)libs	'clip'	*k(a)rīb*	'crepe'

Initial epenthesis in verb forms V–X is explained by the fact that initial C in these forms is linked to an underlying extrasyllabic mora (McCarthy and Prince 1990*a*: 12), whereas the unsyllabified C in words such as *b'lastik* (= *bilastik*) 'plastic' is not linked to an underlying mora (McCarthy and Prince 1990*a*: 13). The moraic difference between these two initial consonant types is accounted for by the Prosodic Morphology Hypothesis, which states that templates are defined in terms of authentic units of prosody: mora (μ), syllable (σ), foot (F), etc. In Cairene *b*(*i*)*lastik*, the initial consonant *b* is part of the basic word and is therefore not associated with a mora—epenthesis to the right of *b* is required to enable *b* to be correctly syllabified. In forms V–X in Cairene and VII–X in San'ani, templates are derived by the prefixation of the minimal prosodic unit, the mora (27). A mora to the left of a nonmoraic consonant cannot associate with the syllable to its right and is thus associated with an initial extrametrical syllable. Verb forms II–IV are derived by mora reduplication, and the majority of San'ani form V and VI verbs (see Section 6.5.4) are derived from form II and III cognates by prefixation of a syllable (*ti-* or *ta-*).

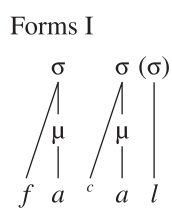
The triliteral verb templates in the dialects are bimoraic (form I), trimoraic (forms II, III, IV, VII, VIII, and IX) or quadrimoraic (forms V, VI, X)—see (30).

The templates for verbal forms II to X can be viewed as direct or indirect derivations from the basic form I template. The infrequent quintimoraic verb forms *stafa^{cc}al* ~ *stifa^{cc}al* ~ *stifa^{cc}il* and *stifā^{c}il* attested in Cairene are derived secondarily

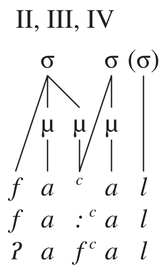
(30) *Bimoraic* *Trimoraic*



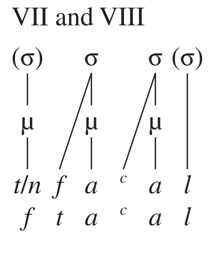
Forms I



II, III, IV

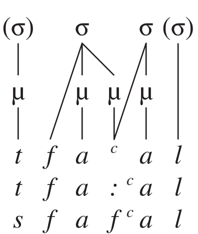


VII and VIII



Quadrimoraic

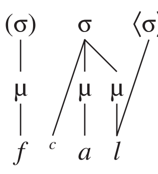
Forms V, VI (CA), and X



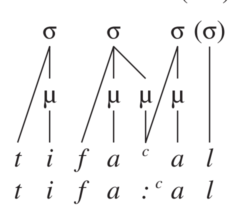
Trimoraic

IX (CA only)





Forms V and VI (SA)



by prefixing *sta-* or *sti-* to a trimoraic (form II or form III) stem. The Cairene form *stafa*^{cc}*al* ~ *stifa*^{cc}*al* ~ *stifa*^{cc}*il* often has the same or a similar meaning to form V of the same root, as in: *stiʔatta* 'to result' (= *tʔatta*), *stiʔaggar* 'to employ, hire' (= *tʔaggar*), *stiḥaggig* 'to offer pretexts, make false excuses' (= *tḥaggig*), *stiḥattim* 'to become inevitable, insist' (= *tḥattim*), *staḥaḍḍar* 'to prepare oneself' (cf. *tḥaḍḍar* = passive of *ḥaḍḍar* 'to prepare, get ready') and *stibarra* 'to have enough of' (= intensive of *tbarra*). In a few cases, *stafa*^{cc}*al* and *stifa*^{cc}*il* have the same meaning as form X or form VIII of the same root, as in: *staragga* 'to hope for' (= *starga*) and *stiraxxa* 'to become loose, slacken' (= *rtaxa*).

The derived forms can be divided into two semantic types—those which extend, and those which reduce the valence of the underlying verb. In what follows, I consider first an analysis of finite verb stems and then examine the derivation of verb forms. Within the discussion of derived verb forms, I look initially at those which

extend the valence of the underlying verb, and then at forms which reduce the valence of it.

6.5.1 *Finite verb stems*

To account for the fact that, in contrast to noun stems, finite verb stems are disyllabic in all forms and always end in CVC in Standard Arabic, McCarthy and Prince (1990*a*: 35) propose that finite verb stems end in a light syllable templatic suffix:

(31) *Finite verb suffix*

σ
|
μ

According to this analysis, form I (CVCVC) comprises a base CV plus the finite verb suffix, form II (CVCCVC) a base CVC plus the finite verb suffix, form III (CVVCVC) a base CVV plus the finite verb suffix, and so on. However, while a suffix may mark a non-finite form, it is counterintuitive that a special morpheme should mark finiteness within the stem. My analysis of verb stems differs from that of McCarthy and Prince. I claim that verbs have light final syllables because, unlike nouns which can stand on their own, verbs are incomplete until properly inflected. When properly inflected, the final syllable becomes heavy in the case of consonant-initial subject suffixes and remains light in the case of vowel-initial subject suffixes. This is illustrated in the paradigm of *katab* 'to write' in Cairene, as shown in (32).

(32)	*katab*	'he wrote'	*katabu*	'they wrote'
	katabit	'she wrote'		
	katabt	'you m.s. wrote'	*katabtu*	'you pl. wrote'
	katabti	'you f.s. wrote'		
	katabt	'I wrote'	*katabna*	'we wrote'

In the case of final-weak verbs with the stem CVCV, the stem-final vowel in Cairene is realized as long before consonant-initial subject suffixes to give a bimoraic pre-suffix syllable.[11] This is illustrated in (33) in the paradigm of *nisi* 'to forget'.

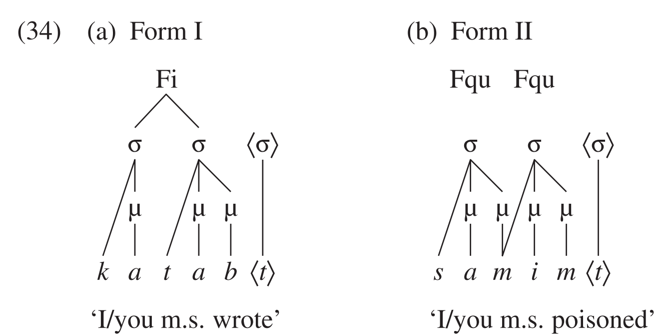
(33)	*nisi*	'he forgot'	*nisyu*	'they forgot'
	nisyit	'she forgot'		
	nisīt	'you m.s. forgot'	*nisītu*	'you pl. forgot'
	nisīti	'you f.s. forgot'		
	nisīt	'I forgot'	*nisīna*	'we forgot'

Before suffixation, the stem of triliteral verbs, and final-weak verbs in Cairene, have the structure of a trochee (form I CVCV(C), form VII n/tCVCV(C), form

[11] In San'ani, the stems of final weak verbs maintain a long final vowel: CVCVV, as in *nisī* 'to forget'.

VIII CtVCV(C), form IX CCVC(C)) or of a trochee plus a degenerate foot (form II CVCCV(C), form III CVVCV(C)). However, since non-inflected finite verbs are unattested, and since inflection is achieved through suffixation in the case of all but the {third person masculine singular} inflectional form, I analyse the verb stem as an incomplete form. The light final syllable is necessary in order to accommodate consonant-initial subject suffixes. Final C of the stem is moraic in pre-consonantal position, but non-moraic in phonological-word-final or in vowel-initial position. In fully inflected forms, verb stems comprise complete prosodic feet when the inflectional suffix is consonant-initial—a single iambic foot (forms I, VII, VIII) or two trochaic feet (forms II, III, V, VI, IX, X). It is only when the inflectional suffix is null or vowel-initial, and only in the case of the derived forms II, III, IV, V, VI, and X, that the stem has the anti-iambic pattern (μμ)(μ), analysed here as a trochee plus a degenerate foot (see Section 6.4.2). Consider the representation of a form-I stem (34a) and a form-II stem (34b) in pre-consonantal position.

(34) (a) Form I (b) Form II



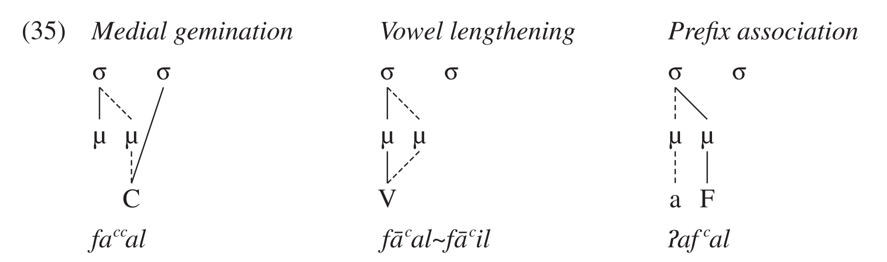
'I/you m.s. wrote' 'I/you m.s. poisoned'

6.5.2 *Forms II, III, and IV*

Forms II, III, and IV have an initial bimoraic syllable formed by mora prefixation. Mora prefixation is analysed here as reduplication of the minimal prosodic unit, the mora. Forms II, III, and IV share the fact that they extend the valence of the underlying verb: form II is almost always transitive, and is often the intensive or causative of form I; form III is usually transitive and often implies participation or effort; in some cases, it has a similar meaning to a form II cognate, as in San'ani *zawwaṭ* 'to act hastily' and *zāwaṭ* 'to be in a hurry, rush (someone)', *jawwab* and *jāwab* 'to reply', *ᶜawwan* and *ᶜāwan* 'to help', *sallā* and *sālā* 'to console', and *najjaḥ* and *nājaḥ* 'to let (someone) succeed'; in Proto-Afroasiatic, *qātala* was an intensive and a variant of *qattala* (Zaborski 1994, 1997, 1999: 49). The relatively rare form IV, more common in San'ani than in Cairene, is always transitive and often has an additional causative sense. The reduplicated mora is associated with the medial root consonant (C) (form II), with the leftmost vowel (V) (form III), or with the vowel of a causative prefix (form IV),[12] as in (35).

[12] Historically, form IV was derived from form I by a causative prefix *sa-*, *ša-*, or *ha-* (cf. Section 6.5.3). The medial vowel of the intermediate form **safaᶜal* was subject to syncope, and the initial consonant of the prefix weakened in (almost all) dialects of Arabic to *ʔ* and, in some, eventually to *0*.

(35)



The mora reduplication which results in lengthening of the leftmost vowel characteristic of form III is also used to derive the active participle of form I verbs, as in *kātib* 'writer', *kāfir* 'infidel, unbeliever', *ʔātil* 'killer' (CA), *gātil* 'killer' (SA).

The mora reduplication which results in medial gemination in the derivation of form II verbs is also used partially to derive the noun of profession or habitude CaGGaaC (for example, *xabbāz* 'baker', CA *gazzār* 'butcher', *baʔʔāl* 'grocer'), and certain nouns of instrument CaGGaaC and CaGGaaCa/ih (e.g. *kabbās* 'plunger, piston', CA *saddāda* 'plug, stopper', *sallāka* 'any instrument used for cleaning or unblocking pipes', *sammā^c^a* 'loud-speaker'). The plurals of many lexicalized active participles are derived by substitution of medial gemination for vowel length, usually accompanied by lengthening of the vowel of the second syllable, as in Cairene *hāmil* pl. *hummal* 'careless person', *rāgil* pl. *riggāla* 'man', *bāyi^c^* pl. *bayyā^c^a* 'seller, salesman', *kāfir* pl. *kuffār* 'infidel, unbeliever' (cf. McCarthy and Prince 1990*a*: 46).

Medial gemination carries with it a sense of intensification in Arabic. Form II verbs often involve action on a plural object, or, in fewer cases, action by a plural subject (Greenberg 1991), as in Syrian *ʔaṭaf* 'to pick flower(s)' versus *ʔaṭṭaf* 'to pick many flowers' (Cowell 1964: 253, cited in Greenberg 1991: 580) and Iraqi *nigab* 'to bore a hole' versus *naggab* 'to bore many holes' (Erwin 1963: 65–6, cited in Greenberg 1991: 581). In San'ani, form II verbs may imply continuous action or action done on several occasions, where the corresponding form I verb implies a single action, as in *katab* 'to write (once)' versus *kattab* 'to write continually, keep writing, write all over'. Nominal patterns with gemination of the second consonant express an intensive meaning, as in Standard Arabic *kurrām*(*un*) 'very noble', *quddūs*(*un*) 'most holy', and *širrīr*(*un*) 'very bad' (Fischer 1997: 193). Where the patterns *fā^c^il* (of the active participle) and *fa^cc^āl* exist for a single root, the *fa^cc^āl* pattern usually indicates intensification of the *fā^c^il* pattern. This may mean that the agent performs a one-off action in the *fā^c^il* pattern, but undertakes an action repetitively or habitually in the *fa^cc^āl* pattern. Cairene *ʔātil* 'killer' contrasts with *ʔattāl* 'a hardened murderer' and *ʔāṣiṣ* 'one who cuts' with *ʔaṣṣāṣ* 'clipper, one who shears animals'.

6.5.3 *Forms VII, VIII, IX, and X*

Forms V–X share 'a reduction or minimization of the valence of the underlying verb' (McCarthy and Prince 1990*a*: 38). In both dialects, forms VII–X are distin-

guished by an initial incomplete syllable, represented on the prosodic template as a mora linked to an extrametrical syllable, as in (27).

Form VII, common in Cairene but relatively rare in San'ani, usually indicates passive or middle voice, as in San'ani *šaġal* 'to work', *nšaġal* 'to be occupied'; *gaḏ̣ā* 'to pay a debt', *ngaḏ̣ā* 'to be finished', and Cairene *kasar* 'to break', *tkasar* 'to be broken'; *xada*^{c} 'to trick', *nxada*^{c} 'to be tricked'. Form VIII[13] usually indicates reflexivity, passivity or reciprocity, as in San'ani *xalā* 'to be through with', *xtalā* 'to be killed'; *ḥabas* 'to imprison', *ḥtabas* 'to be imprisoned', and Cairene *gama*^{c} 'to join', *gtama*^{c} 'to meet'. Form IX in Cairene usually indicates the subject bearing or coming to bear a certain colour or, far less commonly, a defect, as in *ḥmarr* 'to become red', ^{c}*ragg* 'to become lame'. However, a substantial number of Cairene form IX verbs indicate the state of being, or the process of coming to bear, some characteristic other than colour or defect,[14] as in *gramm* 'to become large in stature', *ḥdaʔʔ* 'to become salty (food)', *ḥlaww* ~ *ḥlayy* 'to become sweet', *ḥmaḍḍ* 'to go bad', *xšann* 'to become rough', *dla*^{cc} 'to become bland, insipid'.

Form VII is derived from form I by the prefixation of an initial mora which is filled by /n/ in San'ani, and by /t/ in present-day Cairene. Form VIII is derived from form I by association of /t/ with an initial mora followed by metathesis of /t/ with the initial root consonant. Form VIII metathesis is expressed informally in (36):[15]

(36) tCVCVC → CtVCVC

Form IX is derived by prefixation of a mora which is filled by the initial root consonant (cf. form IV above, Section 6.5.2); the final root consonant is geminated to accommodate the rightmost mora of the original bimoraic template.

Form X (*staf*^{c}*al*) was originally the reflexive or passive of form IV (*ʔaf*^{c}*al*) (McCarthy and Prince 1990*a*: 38), which in a number of ancient Semitic languages[16] had the form **saf*^{c}*al* or **šaf*^{c}*al* (Zaborski 1999: 44). In Arabic dialects today, the *saf*^{c}*al* form IV is attested in Mauritanian (Cohen 1963; Kaye and Rosenhouse 1997: 294) and, to a far lesser extent, in the Yemeni dialect of Ibb. As for forms V, VI, and VIII, the reflexive/passive of form IV was formed historically by prefixation of /t/, and, as for form VIII, subsequent metathesis of /t/ with the initial consonant—the causative prefix consonant /s/. This is diagrammed in (37).

[13] Relatively rare in Cairene. There is evidence from nineteenth-century CE sources that *n* + I verbs were common at this stage, but have since been replaced by *t* + I. Badawi and Hinds list a number of form VIII/*t* + I doublets. We may surmise that *n* + I verb forms were gradually lost along with VIII *fta*^{c}*al* forms and that *t* + I verb forms became more predominant to replace both. This may be taken as tentative evidence that some aspects of level-one non-concatenative morphology are in the process of being replaced by concatenative morphology.

[14] Eisenstein (1990) mentions a total of 103 form IX verbs in Standard Arabic of which around half describe the state or process of bearing a colour, and only seven describe physical defects. The remainder describe activities, states, and processes which relate to neither colours nor defects.

[15] This is described by McCarthy (1979*a*, 1981) as the Eighth Binyan Flop.

[16] Including the Epigraphic South Arabian languages of Qatabanian, Hadramitic, and Minean (Sharaf al-Din 1970: 15; Kogan and Korotayev 1997: 233).

(37) tsaCCaC → staCCaC

Form X is no longer derived actively from form IV. Where form X is derived, it appears to be derived from a form I stem to give the estimative of the basic verb. Therefore, form X has been reanalysed as *sta-* + CCVC. As seen above (see Section 6.5.1), in Cairene *sta-/sti-* is now also prefixed to a form II or III or quadriliteral base to derive additional verb forms.

6.5.4 *Forms V and VI*

Forms V and VI are derived indirectly from form I. The semantic roles played by form V include the medio-passive or reflexive of form II. The main semantic role played by form VI is reciprocity where form III indicates participation. In Cairene, forms V and VI are derived from forms II and III by prefixation of a mora which is filled by /t/, as in *sammim* 'to poison (someone)', *tsammim* 'to be poisoned'; ^{c}*allim* 'to teach (someone)', *t*^{c}*allim* 'to be taught, learn'; and *sābiʔ* 'he competed with (someone)', *tsabʔu* 'they m. competed with each other'; ^{c}*ātib* 'he reproached (someone)', *t*^{c}*atbu* 'they reproached each other'.[17]

In Standard Arabic, forms V and VI are derived from forms II and III by prefixation of *ta-*, as in *takallama* 'he talked' versus *kallama* 'he spoke (to someone)'. In San'ani, the majority of form V and VI verbs are realized with initial *ti-* (*ta-* before a root-initial guttural) in the perfect, but with *t-* in the imperfect and the imperative, as in *taḥākā* 'he talked', *yitḥākā* 'he talks', *itḥākā* 'talk m.s.!'; *tilaṯṯam* 'he put on a face veil', *yitlaṯṯam* 'he puts on a face veil', *itlaṯṯam* 'put on a face veil m.s.!'. Verbs with a root-initial sibilant are realized with *t-* in both aspects with no vowel prosthesis in the perfect (cf. Section 4.3), as in *tsa*^{cc}*al* 'he coughed', *yitsa*^{cc}*al* 'he coughs'. In a few recently introduced or derived verbs, however, the prefix in the perfect is realized as [it] after a consonant or in utterance-initial position, as it is in Cairene. These include *itzawwaj* 'he got married' (cf. *ta*^{c}*arras* 'he got married') and *itma*^{c}*jan* 'it m. was puttied' (< *ma*^{c}*jūn* 'putty').[18]

For forms VII, VIII, IX, and X in Standard Arabic, McCarthy and Prince (1990*a*: 39) analyse the initial incomplete syllable, (σ), as a separate morpheme, which they describe as a detransitivizing prefix. The detransitivizing prefix is represented in (38).

(38) *Detransitivizing prefix*
(σ)

[17] The second semantic sense of form VI in Standard Arabic, that of pretending or acting that which is implied in the basic verb, adjective or root, has been largely taken over in San'ani by quadriliteral verbs with inserted /y/ as C_{ii} (see Section 6.5.6).

[18] It may be that the *t-* form here developed through syncope deleting the prefix vowel in the imperfect and the resulting vowelless prefix then being generalized to the perfect. In Cairene, it is probable that the form V and VI *t-* prefix developed through generalization of the moraic *t-* detransitivizing prefix.

For Cairene and for a few relevant verbs in San'ani the detransitivizing prefix, (σ), functions as a morpheme for forms V and VI in addition to VII, VIII, IX, and X. For the majority of San'ani form V and VI verbs, the detransitivizing prefix is an initial complete syllable, σ, as it is in Standard Arabic.

6.5.5 *Form I imperfect template*

The imperfect aspect is formed by adding a person prefix and a number/gender suffix to the verb stem (see Section 6.4.2), as in Cairene:

(39) *yi* + *garrib* + *u* 'they try'

In (39), *yi*- indicates {third person} person and -*u* indicates {plural}. The full set of verbal prefixes and suffixes for the dialects are presented in Chapter 7 (Table 4). In form I, the template of the imperfect triliteral and final-weak verb differs from that of the perfect. While the perfect has the template CVCV(C), the imperfect has the template CCV(C), as in: *katab* 'he wrote' versus (*yi*)*ktub* 'he writes' (SA) and *nisi* 'he forgot' versus (*yi*)*nsa* 'he forgets' (CA). Historically, the template for the imperfect aspect of form I was derived from that of the perfect through syncope of the unstressed medial vowel (Versteegh 1997: 85 for Standard Arabic). Today, however, there is no evidence for the synchronic derivation of the form I imperfect template from that of the perfect; I therefore assume that, in contrast to the derived verbal forms, the stem of form I triliteral and final-weak verbs has two distinct templatic patterns: CVCV(C) in the perfect and CCV(C) in the imperfect.

6.5.6 *Non-triliteral verbs*

Most verbs and their related nouns have three root consonants. A significant number, however, have either two or four root consonants. Quadriliteral verbs in the perfect invariably take the template CVCCVC in both dialects, thus sharing a trimoraic template with the form II triliteral, as in San'ani *gambar* 'to sit', *laflaf* 'to collect', *galwaz* 'to screw' and Cairene *^{c}ab^{c}ab* 'to cram', *^{c}atras* 'to resist, balk', and *^{c}arʔal* 'to hinder'. Some quadriliteral verbs are derived from a nominal or adjectival source or a foreign loan, as in San'ani *saynam* 'to go to the cinema', *ṣan^{c}an* 'to make (someone) San'ani', *timajnan* 'to become mad' (from *majnūn* 'mad') and Cairene *sawdin* 'to Sudanize'. Many other quadriliteral verbs involve reduplication of a biliteral root (as in *laflaf* 'to collect' and *^{c}ab^{c}ab* 'to cram'), reduplication of C_{iii} (as in San'ani *bahrar* 'to stare' and *baḥlal* 'to bruise', and Cairene *dahnin* 'to make greasy' and *ša^{c}lil* 'to kindle, cause to flare up'), or insertion of an augmenting consonant as C_{ii} or C_{iii}. The principal augmenting consonants in the formation of quadriliteral verbs in San'ani are /w/, /y/, and /l/, and to a lesser extent /n/ or /r/. In general, /l/, /y/, /r/, and /n/ are inserted as C_{ii}, while the labio-velar glide may be inserted as either C_{iii} or, less commonly, C_{ii}. Quadriliteral verbs derived by means of an augmenting consonant usually relate semantically to a biliteral or triliteral verb, noun, or adjective which lacks the augmenting consonant, as in San'ani *ṣalfā*

'to rinse', *ṣaffā* 'to clean'; *dalhaf* 'to keep pushing', *dahaf* 'to push'; *ṭambal* 'to drum', *ṭabbal* 'to drum'; *šangaᶜ* 'to climb', *šagaᶜ* 'to cross a stream'; *ʔaynag* 'to make someone elegant', *ʔanīg* 'elegant'; *fartaš* 'to spy', *fattaš* 'to inspect'; *harwas* 'to shove something into a small hole', *haras* 'to bury something'; *ġaswal* 'to wash up', *ġasal* 'to wash'. Quadriliterals which relate to a biliteral or triliteral verb or noun often have a more specific meaning than the basic biliteral or triliteral, as in San'ani *ṣalfā* 'to rinse' versus *ṣaffā* 'to clean'; *ġaswal* 'to wash up' versus *ġasal* 'to wash'; and *tigašwaṭ* 'to shiver convulsively' versus *gašaṭ* 'to shiver'; and as in Cairene *dahnin* 'to make greasy' versus *dahan* 'to coat with oil, paint, etc.'.

Quadriliterals derived through reduplication of a biliteral root tend to have a combined diminutive and/or iterative sense where the biliteral implies single action, as exemplifed by San'ani *šamm* 'to smell', *šamšam* 'to sniff'; *dagg* 'to knock', *dagdag* 'to knock several times (with little knocks)'; *ᶜass* 'to touch', *ᶜasᶜas* 'to touch several times, stroke', and Cairene *rašš* 'to sprinkle', *rašraš* 'to sprinkle all over or repeatedly'; *dabb* 'to bang, thump, hit', *dabdib* 'to make a repeated banging, thudding (with feet)'. San'ani quadriliterals with an infix /l/ as C_{ii} or /w/ as C_{iii} usually imply greater intensity and continuity of action than the related triliteral. Thus, *dalkam* 'to hit violently, keep hitting' contrasts with *dakam* 'to hit', *dalhaf* 'to keep pushing' contrasts with *dahaf* 'to push', *kaltab* 'to keep writing' contrasts with *katab* 'to write', *tigašwaṭ* 'to shiver convulsively' contrasts with *gašaṭ* 'to shiver' and *tinagwal* 'to move from place to place' with *nagal* 'to move'.

Quadriliteral verbs usually have at most one derived form through prefixation of *t-* (*ti-* or *ta-* in San'ani, cf. Section 6.5.4). For a few quadriliteral verbs, however, Cairene derives a further form by prefixation of *sti-*/*sta-*. This often has the same meaning as the basic form I, as in *stiḥargim* 'to hover around' (= *ḥargim*), or the derived form II, as in *stiraxrax* 'to become loose or flabby' (= *traxrax*). While the form I quadriliteral shares a template with the form II triliteral, the form II quadriliteral shares a template with the form V triliteral, tCVCCVC in Cairene, tVCVCCVC in San'ani. As for the relationship between triliteral forms II and V, quadriliteral form II often gives the reflexive or medio-passive of the form I verb, as in San'ani *gaṣgaṣ* 'to cut up', *tigaṣgaṣ* 'to be cut up'; *ʔaynag* 'to make someone elegant', *taʔaynag* 'to make oneself elegant'; and Cairene *ᶜarʔal* 'to hinder', *tᶜarʔal* 'to be hindered'; and *dahwis* 'to trample on', *tdahwis* 'to be trampled on'. Several form II quadriliterals with /y/ in San'ani, however, impose a 'pretend to' or 'act as' sense on the basic triliteral verb or adjective, one of the alternative senses of the triliteral form VI template in Standard Arabic. Examples include *timaywat* 'to pretend to be dead' (cf. Standard *tamāwat*), *timayraḍ* 'to feign illness' (cf. Standard *tamāraḍ*), *tibaylah* 'to act stupidly' (cf. Standard *tabālah*), *taxaybaṣ* 'to pretend innocence cunningly', *taḥayḏag* 'to act miserly' and *taᶜayzaz* 'to pretend to refuse'.

Biliteral verbs are in many ways more interesting morphologically than quadriliteral verbs, because they involve a number of different templates which are unique to them. The dialects have four types of biliteral verbs: deficient verbs such as *kal* and *xad* in Cairene, which are derived historically from glottal-stop-initial

stems and which now lack an initial consonant in the perfect; final-weak verbs such as *nisi* and *rama* in Cairene, *nisī* and *ramā* in San'ani, which lack a final consonant; doubled verbs such as *dabb* 'to bang, thump, hit' in Cairene, in which the second consonant of the stem is geminate; and hollow verbs such as Cairene *ʔāl* (*gāl* in San'ani) and *šāl* which lack a medial consonant. In this section I consider the analysis of final-weak verbs, doubled verbs, and hollow verbs.

6.5.6.1 *Final-weak verbs*

Arabic dialects have a set of verbs which share a vowel-final stem. These verbs are traditionally known as third-weak or final-weak verbs. The stem-final vowel is short in Cairene and long in San'ani. In Cairene, the quality of the final vowel is identical to that of the initial vowel of the stem, as in: *nisi* 'he forgot' and *rama* 'he threw'. In San'ani, the leftmost stem vowel of verbs ending in *-ī* is most commonly /i/, but /u/ where one of the root consonants is a pharyngealized coronal (cf. Section 10.5): *nisī* 'to forget' and *dirī* 'to know' contrast with *ruḏ̣ī* 'to want' and *xuṭī* 'to walk'. Consider the paradigms of CiCi-type (40a) and CaCa-type (40b) final-weak verbs in San'ani and Cairene.

(40) (a)

	SA	CA
3m.s.	*nisī*	*nisi*
3f.s.	*nisiyat*	*nisyit*
3m.pl.	*nisiyū*	*nisyu*
3f.pl.	*nisiyayn*	X
2m.s.	*nisīt*	*nisīt*
2f.s.	*nisītī*	*nisīti*
2m.pl.	*nisītū*	*nisītu*
2f.pl.	*nisītayn*	X
1s.	*nisīt*	*nisīt*
1pl.	*nisīnā*	*nisīna*

(b)

	SA	CA
3m.s.	*ramā*	*rama*
3f.s.	*ramit*	*ramit*
3m.pl.	*ramaw*	*ramu*
3f.pl.	*ramayn*	X
2m.s.	*ramayt*	*ramēt*
2f.s.	*ramaytī*	*ramēti*
2m.pl.	*ramaytū*	*ramētu*
2f.pl.	*ramaytayn*	X
1s.	*ramayt*	*ramēt*
1pl.	*ramaynā*	*ramēna*

When the vocalic melody of a final-weak verb is /i/ in Cairene (40a), the stem takes a long vowel /ī/ before consonant-initial subject suffixes. In San'ani, the unsuffixed stem ends in a long vowel; therefore, the stem of CiCi verbs remains

unchanged before consonant-initial subject suffixes. In verbs with the vocalic melody /a/—as in (40b)—the stem in Cairene takes a long mid vowel /ē/ before consonant-initial subject suffixes, and in San'ani a diphthong /ay/.

Historically, the long vowel/diphthong of the stem goes back to a time when final-weak verbs were analysable as two sound consonants and a glide (either **w* or **y*). The underlying glide was not realized word-finally due to a constraint on stem-final diphthongs in this position. In word-final position, the diphthong was replaced by a long vowel—either /ā/ or /ī/ depending on the vocalic melody of the verb. In a number of dialects of Arabic, including Cairene, the long vowel was shortened historically due to a further constraint on word-final long vowels (see Section 4.2). The glide element of the root manifested itself in a long vowel or in a diphthong to the left of consonant-initial subject suffixes. Thus, Standard Arabic *nasiytu* (= *nasītu*) 'I forgot' is analysed as association of the root /n-s-y/ with the template CaCiC (+ *tu*) and *ramaytu* 'I threw' as association of the root /r-m-y/ with the template CaCaC (+ *tu*). In Cairene, the pre-consonantal diphthong **ay-* in CaCa stems was subject to coalescence historically, and today has a monophthongal realization /ē/. In San'ani, the original diphthong /ay/ has remained.

Today final-weak verbs are analysed as vowel-final and not as glide-final in both dialects: final-weak verbs have the stem CVCV in Cairene and CVCVV in San'ani. Before consonant-initial subject suffixes, the stem has an allomorph ending in a long vowel in Cairene (/ī/ in CiCi stems, /ē/ in CaCa stems). In San'ani, a long vowel /ī/ is realized before consonant-initial subject suffixes in CiCii stems and a diphthong /ay/ in CaCaa stems.

There are three main reasons for considering final-weak verbs to be only historically linked to final-glide roots. Firstly, although verbs are derived historically from both *w*-final and *y*-final roots, the glide of *w*-final roots does not manifest itself in inflectional forms: the verb *da*^{c}*ā–yad*^{c}*ū* 'to invoke God' in San'ani, for example, is related to the noun *da*^{c}*wih*. Before a consonant-initial subject suffix, the perfect stem is realized as *da*^{c}*ay-*, and not as *da*^{c}*aw-* as it is in Standard Arabic. Irrespective of the historical root, the diphthong /ay/ in San'ani and long mid-vowel /ē/ in Cairene is realized pre-consonantally, and has replaced the original **aw-* of **w*-final verbs. Secondly, the /ē/ variant has at least made a partial attempt to squeeze out the /ī/ variant in Cairene—/ē/ is obligatory before consonant-initial subject suffixes in CaCa verbs, but is also a less common variant in CiCi verbs: 'I forgot' can be realized as either *nisīt* or *nisēt* (Abdel-Massih 1975: 137; Broselow 1976: 148). On analogy with final-weak verbs, the diphthong/long mid-vowel is now used as an allomorphic adjunct before consonant-initial subject suffixes in doubled verbs (see Section 7.1.1). Thirdly, there is evidence that coalescence of diphthongs which resulted in the pre-consonantal form /ē/ is no longer a synchronic process in Cairene (see Section 2.4.3).

6.5.6.2 *Doubled verbs*

The stems of doubled verbs end in a final geminate consonant. Consider the following paradigms of the form I doubled verb *ḥabb* 'to love, like' in San'ani and

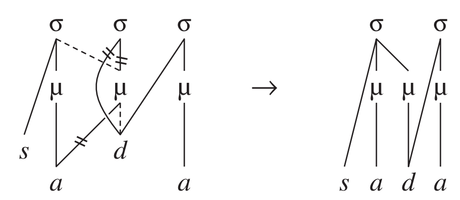
Cairene. The Standard Arabic paradigm[19] is provided for comparison in the left-hand column:

(41)

	Standard	*SA*	*CA*
3m.s.	*ḥabba*[20]	*ḥabb*	*ḥabb*
3f.s.	*ḥabbat*	*ḥabbat*	*ḥabbit*
3m.pl.	*ḥabbū*	*ḥabbū*	*ḥabbu*
3f.pl.	*ḥababna*	*ḥabbayn*	X
2m.s.	*ḥababta*	*ḥabbayt*	*ḥabbēt*
2f.s.	*ḥababti*	*ḥabbaytī*	*ḥabbēti*
2m.pl.	*ḥababtum*	*ḥabbaytū*	*ḥabbētu*
2f.pl.	*ḥababtunna*	*ḥabbaytayn*	X
1s.	*ḥababtu*	*ḥabbayt*	*ḥabbēt*
1pl.	*ḥababnā*	*ḥabbaynā*	*ḥabbēna*

Historically, doubled verbs were mapped to the same disyllabic bimoraic template as triliteral verbs. However, they differed from triliteral verbs in that the second syllable of the template was realized only when the verb took a consonant-initial subject suffix, as in *ḥababnā* 'we loved'. Before vowel-initial subject suffixes, some type of Double Rule took place to produce a geminate final consonant in a monosyllabic base (Moore 1990: 81). The Standard Arabic Double Rule is illustrated in (20) in the derivation of *sadda* 'he closed up' from **sadada*.

(42) *Double Rule*



According to the Double Rule, resyllabification of the coda mora results in desyllabification from the onset just in case the coda mora and the onset are linked to the same consonant melody. In dialects of Arabic today, doubled verbs only ever exhibit a monosyllabic base, irrespective of whether the subject suffix is consonant- or vowel-initial.

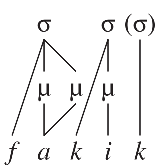
Broselow (1976) argues that doubled verbs in Cairene share the same underlying verbal template as the triliteral verb, while demonstrating that it is no longer applicable to vowel-final biliteral verbs (such as *nisi* and *rama*), to initial-weak

[19] Although forms I and IV of this root are attested, form IV is more common in Modern Standard Arabic. It is possible that form I was more common in Classical Arabic, and that it is avoided in Modern Standard Arabic due to its association with non-Standard dialect forms. In unvocalized texts, which constitute the vast majority of written texts in Standard Arabic, form IV is indistinguishable from form I in the imperfect.

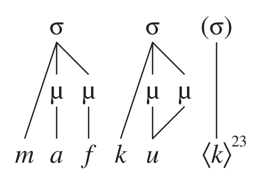
[20] In pause, the final short vowel is not pronounced in Standard Arabic.

verbs (such as *kal* and *xad*) or to hollow verbs. Part of her argument for this analysis is that doubled roots in Cairene[21] map onto active and passive participle templates in the same way as triliteral roots:[22]

(43) (a) *Active participle* (b) *Passive participle*



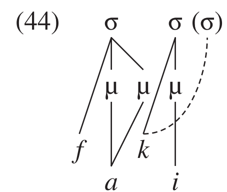
fākik 'having undone';
cf. *kātib* 'having written'



mafkūk 'undone, released';
cf. *maktūb* 'written'

The association of the second consonant of a doubled root with two adjacent templatic positions, however, is insufficient to claim that the doubled verb shares the same underlying template as the sound triliteral verb: spreading of the second consonant to two adjacent consonantal slots is predicted by the requirement that all templatic positions are matched with a melody (see Section 4.1). In the derivation of active and passive participles, the second root consonant maps onto the syllable node of the rightmost syllable, and then spreads to the node of the final incomplete syllable:

(44)



fākik 'having undone'

It appears that the Double Rule became first morphologized and then lexicalized in Arabic dialects such that a distinct prosodic template now exists for the doubled verb. The evidence for this is threefold: firstly, there is no inflectional form of any doubled verb with a disyllabic stem in the dialects; secondly, while there are three vocalic melodies for triliteral verbs in the perfect aspect in both Cairene and San'ani (CaCaC, CiCiC, and CuCuC), the doubled verbs have a single vocalic melody (CaCC) (Broselow 1976: 160 for Cairene); and thirdly, in Cairene *t/n* + doubled form I verbs and doubled VIII verbs, the base is invariant in the perfect

[21] As in San'ani.

[22] In Standard Arabic, the Double Rule applies for active participles as well as for finite verbs. The active participle of doubled roots therefore has a medial CVVC syllable, as in: *mādd*(*un*) 'stretching', *mārr*(*un*) 'passing; passer-by', *fārr*(*un*) 'fugitive' (cf. Section 5.4.1.3, Watson 1999*d*). The two dialects have a few stative adjectives of this pattern which contrast with active participles used in a verbal or adjectival sense: San'ani *jāff* (Cairene *gāff*) 'dry' contrasts with *jāfif* (Cairene *gāfif*) 'drying'.

[23] To account for the fact that domain-final CVVC syllables have a different prosodic status from domain-final CVCC and CVC syllables, the rightmost C of CVVC is placed between angled brackets and attached to an incomplete syllable node.

and imperfect and in the participle form[24] (cf. Woidich and Heinen-Nasr 1995: 156), as in (45):[25]

(45)

Form I	t/n + *form I*	*Imperfect*	*Participle*	*Gloss*
sabb	*tsabb*	*yitsabb*	*mitsabb*	'to be abused, reviled'
^{c}*agg*	*t*^{c}*agg*	*yit*^{c}*agg*	*mit*^{c}*agg*	'to be hit, given a blow'
^{c}*arr*	*t*^{c}*arr* ~ *n*^{c}*arr*	*yit/n*^{c}*agg*	*mit/n*^{c}*agg*	'to be disgraced, shamed'
NA	*štarr*	*yištarr*	*mištarr*	'to ruminate, chew the cud'
xaṣṣ	*xtaṣṣ*	*yixtaṣṣ*	*muxtaṣṣ*	'to concern o.s.'

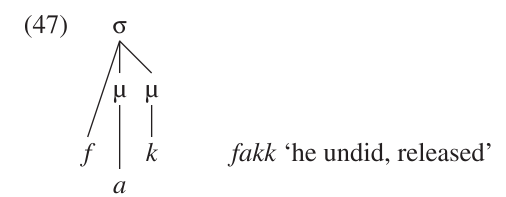
By contrast, triliteral form VII and VIII verbs in Cairene have the vocalic melody /a/ in the perfect (irrespective of the vocalism of the underlying form I verb, as illustrated in the fourth example in (46)), but /i/ in the imperfect aspect and the participle (Abdel-Massih 1975: 188).

(46)

Form I	t/n + *form I*	*Imperfect*	*Participle*	*Gloss*
saʔal	*tsaʔal*	*yitsiʔil*	*mitsiʔil*	'to be asked'
zalaṭ	*tzalaṭ*	*yitziliṭ*	*mitziliṭ*	'to be swallowed without chewing'
zalaʔ	*nzalaʔ*	*yinziliʔ*	*minziliʔ*	'to slip, slide, glide'
^{c}*irif*	*t*^{c}*araf*	*yit*^{c}*irif*	*mit*^{c}*irif*	'to be, become known, recognized'
NA	*štara*	*yištiri*	*mištiri*	'to buy'

San'ani provides further evidence that doubled verbs now have a distinct verbal template: it has a few verbs with identical second and third consonants which map onto a disyllabic bimoraic template in the perfect, and which take the triliteral -CCVC stem in the imperfect. These include *jifif–yijfaf* 'to dry intr.', *jinin–yijnan* 'to go mad', and *ṣumum–yiṣmum* 'to become deaf'. I therefore assume that the phonological process which initially produced allomorphic variation in the stem of Arabic doubled verbs is no longer active, either as a phonological or as a morphological process, and that doubled verbs constitute a frozen form mapping onto a

(47)



[24] In the less common forms IV and X, the imperfect and active participle template usually takes a different vocalic melody from the perfect, as in: form IV 'to fail to meet an obligation' *ʔaxall* (perf.), *yixill* (imperf.), *mixill*; form X 'to subjugate' *stazall* (perf.), *yistizill* (imperf.), *mistizill* (participle); however, cf. 'to treat with contempt' *staxaff* (perf.), *yistaxaff* / *yistixiff* (imperf.), *mistaxaff* / *mistixiff* (participle), and 'to deserve, be entitled to' *staḥaʔʔ* (perf.), *yistaḥaʔʔ* (imperf.), *mistaḥaʔʔ* (participle).

[25] Examples from Badawi and Hinds (1986).

bimoraic, monosyllabic template. The leftmost consonant maps onto the onset of the syllable, the rightmost consonant onto the second mora of the template, and the vowel to the leftmost mora, as in (47).

6.5.6.3 *Hollow verbs*

Hollow verbs are traditionally analysed as verbs with a medial glide. In the perfect aspect, the quality of the glide is not realized in the {third person masculine singular} inflectional form or before vowel-initial subject suffixes. The glide is realized in certain derived verbal and nominal forms and shows itself in the quality of the stem vowel in the imperfect aspect of form I verbs. The verbs *šāf* 'to see' in Cairene and *gāl* 'to say' in San'ani are hollow verbs with an original medial root consonant **w*. The labio-velar quality of the original medial consonant surfaces in the /ū/ vowel of the imperfect aspect and in the short /u/ vowel of the perfect aspect when the verb takes a consonant-initial subject suffix. Consider the paradigm of Cairene *šāf* in the perfect and imperfect aspects.

(48)

Perfect		*Imperfect*	
šāf	'he saw'	*yišūf*	'he sees'
šāfit	'she saw'	*yišūf*	'she sees'
šuft	'I saw'	*ašūf*	'I see'
šuft	'you m.s. saw'	*tišūf*	'you m.s. see'
šufti	'you f.s. saw'	*tišūfi*	'you f.s. see'
šufna	'we saw'	*nišūf*	'we see'
šuftu	'you pl. saw'	*tišūfu*	'you pl. see'
šāfu	'they saw'	*yišūfu*	'they see'

San'ani *zād* 'to do more, again' has an original medial root consonant **y*. The palatal quality of the medial consonant surfaces in the /ī/ vowel of the imperfect aspect and in the short /i/ vowel of the perfect aspect when it takes a consonant-initial subject suffix.

(49)

Perfect		*Imperfect*	
zād	'he did more/again'	*yizīd*	'he does more/again'
zādat	'she did more/again'	*yizīd*	'she does more/again'
zidt	'I did more/again'	*azīd*	'I do more/again'
zidt	'you m.s. did more/again'	*tizīd*	'you m.s. do more/again'
zidtī	'you f.s. did more/again'	*tizīdī*	'you f.s. do more/again'
zidnā	'we did more/again'	*nizīd*	'we do more/again'
zidtū	'you m.pl. did more/again'	*tizīdū*	'you m.pl. do more/again'
zidtayn	'you f.pl. did more/again'	*tizīdayn*	'you f.pl. do more/again'
zādū	'they m. did more/again'	*yizīdū*	'they m. do more/again'
zādayn	'they f. did more/again'	*yizīdayn*	'they f. do more/again'

In the verbal nouns of derived hollow verbs IV and X, the medial glide is not realized in either dialect and is compensated for by the feminine nominal suffix *-a*

(-*ih* SA) (cf. Section 7.2, Table 5). Consider the following examples from Cairene (prosthetic vowels added for relevant forms).

(50)	*Root*	*Verb*		*Verbal noun*
	g-w-b	*ʔagāb*	'to reply'	*ʔigāba*[26]
		istagāb	'to respond, react'	*istigāba*
	q-w-m	*ʔaqām*	'to erect, put up'	*ʔiqāma*[27]
	b-y-n	*istabān*	'to pan out'	*istibāna*

In participles of derived hollow verb forms IV and X, the medial glide is not realized and is compensated for by a long vowel: /ī/ in the active participle and /ā/ in the passive participle. Consider again examples from Cairene:

(51)	*Root*	*Verb*		*Active/passive participle*
	š-w-r	*ʔašār*	'to refer'	*mušīr* / *mušār*
		istašār	'to consult'	*mistašīr* / *mustašār*
	s-w-r	*ʔasār*	'to excite, stimulate'	*musīr* / *musār*
		istasār	'to excite, stimulate'	*mustasīr* / *mustasār*

Hollow verbs are traditionally said to arise from a restriction on simplex intervocalic glides in verbs. While there are a few nouns of the shape CawaC(un) in Standard Arabic, as in *xawal*(*un*) 'passive homosexual' and *ḥawar*(*un*) 'ox; white leather; poplar', there are no Caw/yaCa verbs and a very few Caw/yiCa verbs which are themselves rare in occurrence—these include *ḥawira* 'to have its white and black strongly delineated (eye)', *ḥawisa* 'to be brave, daring', and *ḥawiṣa* 'to have an eye contracted in its outer angle' (examples from Hava 1915). In modern dialects of Arabic, there is evidence that the hollow verbs have become lexicalized and are no longer morphologically productive. Thus I argue that hollow verbs have a monosyllabic, bimoraic template which is realized as CaaC before null- or vowel-initial subject suffixes and as CVC before consonant-initial suffixes. The quality of the stem vowel in the latter case is determined lexically.

Evidence for the lexicalization of hollow verbs is threefold. First, as Broselow (1976) points out for Cairene, many deverbal nouns and adjectives of hollow roots take a medial /y/, irrespective of whether the original weak consonant of the root is /y/ or /w/. In both Cairene and San'ani, form I hollow verb active participles take the pattern CāyiC irrespective of the original root of the word. Cairene *šāf* 'to see' and San'ani *gām* 'to get up', which share an original medial radical **w*, have the active participles *šāyif* 'seeing' and *gāyim* 'getting up'. Similarly, hollow form VII and VIII verbal nouns are formed on the pattern iCCiyāC, irrespective of the quality of the original medial glide. Examples attested in both dialects include *insiyāb* verbal noun of *insāb* 'to pour, flow' (root /s-y-b/), *ixtiyār* verbal noun of *ixtār* 'to choose' (root /x-y-r/), and *iḥtiyās* verbal noun of *iḥtās* 'to become perplexed' (root /ḥ-w-s/). Secondly, and again as Broselow (1976) points out for Cairene, while the

[26] From Standard Arabic. [27] From Standard Arabic.

quality of the medial consonant of hollow verbs is reflected in the stem vowel in inflected forms of the basic verb, in derived verb forms VII and VIII the quality of the stem vowel does not change in the imperfect aspect, nor when the vowel is shortened in the perfect. Consider the following examples (prosthetic vowels added in forms VII–X):

(52)	CA	form I	*šāl*	'he carried'	*šilt*	'I/you m.s. carried'
		form VII	*itšāl*	'he was carried'	*itšalt*	'I was/you m.s. were carried'
		form VIII	*ištāl*	'he carried'	*ištalt*	'I/you m.s. carried'[28]
	SA	form I	*ᶜār*	'he borrowed	*ᶜirt*	'I/you m.s. borrowed'
		form X	*istaᶜār*	'he borrowed'	*istaᶜart*	'I/you m.s. borrowed'
		form I	*bāᶜ*	'he sold'	*yibīᶜ*	'he sells'
		form VIII	*ibtāᶜ*	'it m. was sold'	*yibtāᶜ*	'it m. is sold'

Thirdly, a number of medial glide roots incorporated into the morphology of both dialects have the perfect aspect template CVCVC—with the medial glide realized as a strong consonant. This indicates that any historic restriction on intervocalic glides in verb forms in the dialects has now been relaxed. In both dialects, 'strong *w/y*' verbs are attested with the vocalic melodies /a/ and /i/ (and /u-i/ in San'ani). In (53a) are examples from Cairene;[29] (53b) provides examples from San'ani.

(53)	(a)	*tawal*	'to daze, bewilder'
		gawaz	'to make double'
		ḥawag	'to expose a need'
		ḥawad	'to turn, divert'
		ḥawas	'to perplex, confuse'
		xawat	'to pester, bother'
		xayal	'to distract, disturb'
		dayan	'to have (someone) in one's debt'
		ḥiwil	'to develop strabismus, become squint eyed'
		ẓiwir	'to choke (on something caught in the throat)'
		ṭiwil	'to become tall'
	(b)	*rawas*	'to go ahead'
		rawaš	'to rinse something'
		rawad	'to be patient, act slowly'
		xawaš	'to be confused'
		ruwij	'to be reduced (price)'
		xuwir	'to be eager, desire'

[28] This is given as a Cairene verb in Lehn and Abboud (1965: 197), but is said to be non-Cairene by Badawi and Hinds (1986). M. Woidich says that this verb is a feature of rural dialects today, but notes it may be found in nineteenth-century CE Cairene texts (M. Woidich p.c.).

[29] Badawi and Hinds (1986) include at least 26 form I 'strong *w/y*' medial glide verbs and many more derived 'strong *w/y*' verbs.

*jiwi*ᶜ	'to be hungry'
zuwir	'to grow tired'
šiwik	'to be pricked (by thorn, etc.)'
ṭuwil	'to become tall'

In contrast to participles of hollow verbs, the active and passive participles of these medial glide verbs take medial /w/ in the case of medial-*w* roots and /y/ in the case of medial-*y* roots:

(54)

		Verb	*Active participle*	*Passive participle*
CA	*xayal*	'to distract, disturb'	*xāyil*	*maxyūl*
	ḥawag	'to expose a need'	*ḥāwig*	*maḥwūg*
	sawar	'to deafen'	*sāwir*	*maswūr*
	dawax	'to make dizzy'	*dāwix*	*madwūx*
cf.	*dāx*	'to become dizzy'	*dāyix*	NA
SA	*jiwi*ᶜ	'to be hungry'	*jāwi*ᶜ	NA
	xuwir	'to desire'	*xāwir*	NA
cf.	*fār*	'to boil intr.'	*fāyir*	NA

The medial glide also surfaces in derived verb forms IV, VII, VIII and X of 'strong *w/y*' verbs and their verbal nouns, again in contrast to the derived forms of lexicalized hollow verbs (prosthetic vowels added):

(55)

	Verb		*Verbal noun*	*(Active) participle*
CA	*ittawal*	'to become dazed'[30]	NA	*mittiwil*
	itsawar	'to be deafened'	NA	*mitsiwir*
	istabwax	'to consider tedious, silly'	*istibwāx*	*mistabwax*
	istabyaḍ	'to select for whiteness'	*istibyāḍ*	*mistabyaḍ*
	istagwib	'to cross-examine'	*istigwāb*	*mistagwib*
	istaxyib	'to consider a failure'	*istixyāb*	*mistaxyib*
	istadyik	'to consider virile'	*istidyāk*	*mistadyik*
SA	*ʔaṣwar*	'to deafen'	*ʔiṣwār*	*muṣwur*
	inzawar	'to be afraid (*min* of)'	*inziwār*	*minzawir*
	intawal	'to take (e.g. food)'	*intiwāl*	*muntawil*
	*ištawa*ᶜ	'to be ugly'	*ištiwā*ᶜ	*mištawi*ᶜ
	ištawar	'to consult'	*ištiwār*	*mištawir*
	istašwar	'to consult'	*istišwār*	NA

6.5.7 *Verbal derivatives*

Verbal derivatives fall into two classes: those which continue to be actively derived in the dialects, and those which have become lexicalized. On the whole, it appears that derivational morphology which affects the stem directly is, at least in Cairene,

30 Normally *t* + I verbs do not have a verbal noun of their own, but take the form I verbal noun.

beginning to give way to a morphology which involves mainly affixal elements. Where this is not the case, certain aspects of the derivational morphology have been simplified: with the exception of participles derived from the lexicalized hollow verbs, very few derived verbs have distinct active and passive participles (cf. Aboul-Fetouh 1969: 78).[31] In most cases, participles of derived verbs are formed by the prefixation of *mi-* to the imperfect stem. Where Badawi and Hinds (1986) list a passive participle alongside an active participle for a verb, it often has the Standard-looking prefix *mu-* (as in *murattab* 'salary', *murattal* 'chanted' from *rattil* 'to chant', *mursal* 'sent' from *ʔarsal* 'to send'). In some cases, the passive participle differs from the active participle only in the quality of the prefix vowel (as in *miḥtall* 'occupier' versus *muḥtall* 'occupied'). In addition, while San'ani often has different vocalisms for the perfect and imperfect aspect of derived verbs, in Cairene the vocalism of the imperfect stem of most verb forms (II, III, V, VI, most IX, most X, quadriliteral I and II) is identical to that of the perfect stem (cf. Abdel-Massih 1975: 162, 187–9). For many derived verbs (VII, VIII, some IX, some X) in which the imperfect vocalism differs from that of the perfect, the imperfect vocalic melody is /i/ throughout (as in *itmasak–yitmisik* 'to be grasped'), so that these forms exhibit no complex vocalic melody in contrast to cognate forms in Standard Arabic.[32]

Lexicalized verbal derivatives include nouns of instrument formed on the pattern *mifᶜāl* (SA), *mufᶜāl* (CA) (*miftāḥ* 'key' (SA), *muftāḥ* 'key' (CA), for example) and, to a lesser extent, nouns of place formed on the pattern *mafᶜal*, *mafᶜala* (CA), *mafᶜalih* (SA), or *mifᶜālih* (SA) (for instance, *mafraj* 'large reception room' (SA), *miġsālih* 'launderette' (SA), *maktab* 'office', *madrasa* 'school' (CA)). Verbal derivatives which continue to be actively derived include the participles and verbal nouns of most derived verbs. In the following section, I consider the derivation of verbal participles and verbal nouns in the two dialects.

6.5.7.1 *Verbal participles of form I verbs*

Form I is the only verbal form which regularly has both active and passive participles. The active and passive participles of form I sound triliteral verbs take the same patterns in both dialects: the active participle has the anti-iambic pattern CaaCiC (McCarthy and Prince 1990*a*: 28 for Standard Arabic), and the passive participle has the pattern maCCuuC. The template of the active participle is derived from that of the finite verb by initial-mora reduplication[33] (as for derivation of the derived verb forms II, III, and IV above).

[31] Abdel-Massih presents patterns for passive as well as active participles for sample form VIII and X verbs (Abdel-Massih 1975: 188–9). This is probably due to the Standard nature of the verbs involved (*iḥtaram* 'to respect' and *istaᶜmal* 'to use').

[32] The imperfect vocalic melody in the stem of Standard Arabic derived verbs (excluding V and VI) is /a-i/, as in: *yudarrisu* 'he teaches', *yusāfiru* 'he travels', *yaštaġilu* 'he works', *yastaᶜmilu* 'he uses'. The imperfect vocalic melody of Standard Arabic V and VI is /a/, as in: *yatazawwaju* 'he gets married', *yataḏāharu* 'he pretends'.

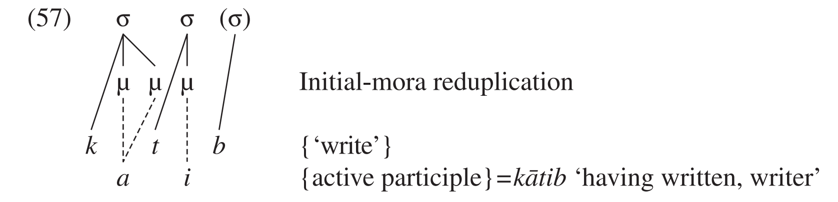
[33] McCarthy and Prince's mora prefixation (1990*a*: 29).

(56) *Initial-mora reduplication* (*Form I active participle*)



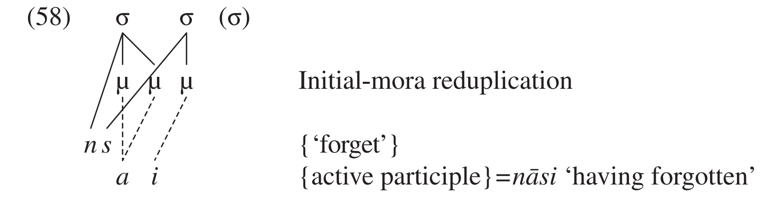
The consonants of the finite verb link with non-moraic positions on the template, while the vocalic melody of the active participle /a-i/ associates with the moraic slots, delinking the original vocalic melody of the verb. (The linking of the vocalic melody shown in progress.)

(57)



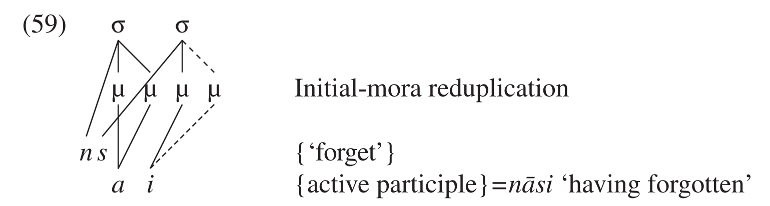
Verbs with final-weak consonants such as Cairene *nisi* 'to forget' lack a final consonant and therefore fail to associate material with the final extrametrical slot in the active participle:

(58)



In San'ani, stem-final long vowels are maintained, and the active participle of *nisī* 'to forget' is realized with a final long vowel, *nāsī*. In this case, I assume that mora-reduplication applies to accommodate the final long vowel, since short final vowels are not attested in the dialect:

(59)



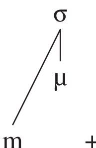
The passive participle of sound triliteral verbs has the pattern maCCuuC. This is an example of a level-one morphological process which combines affixation with templatic transformation. The passive participle involves prefixation of the syllable *mμ-* on the prosodic template together with reduplication of the final mora of the finite template. The vocalic melody of the passive participle, /a-u/, then associates with the moraic slots of the template. Reduplication of the final mora of the finite template is attested in other areas of the morphology, including in the deriva-

tion of verbal nouns of some form I and most derived verb forms (see Section 6.5.7.4). The form I passive participle is derived as follows:

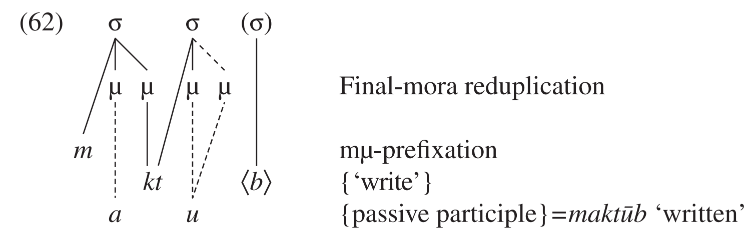
(60) *Final-mora reduplication* (*Form I passive participle*)



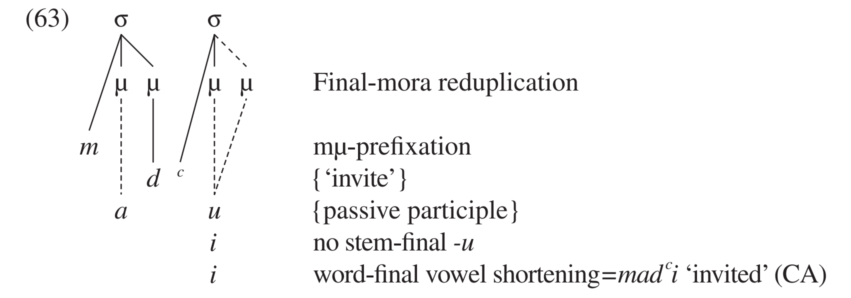
(61) *Mμ-prefixation* (*Form I passive participle*)



Association of the consonants of the finite verb and the passive participle vocalic melody /a-u/ with the template takes place as shown in (62).

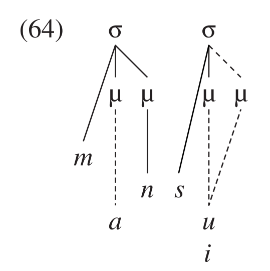
(62)


The passive participle of final-weak verbs is derived as follows: final-weak verbs lack a final consonant, therefore the final extrasyllabic slot of the passive participle template remains unfilled. In Cairene the long vowel is shortened through mora deletion, since Cairene does not tolerate word-final long vowels, and the final vowel is realized as [i]: stem-final *-u* is restricted to loans from Standard Arabic, as in Cairene *yabdu* 'it appears' and San'ani *yad*^{c}*ū* 'he invokes God', and loans from other languages.

(63)


In San'ani, the final-weak passive participle is derived as in Cairene with the exception that long vowels are attested word-finally—thus, word-final vowel shortening does not take place—see (64).

(64)



Final-mora reduplication

mμ-prefixation
{‘forget’}
{passive participle}
no stem-final *-u*=*mansī* ‘forgotten’ (SA)

6.5.7.2 *The* faᶜlān *adjective*

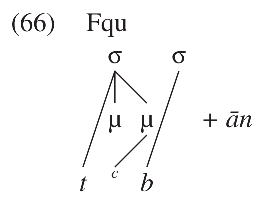
The *faᶜlān* adjective is very common in Cairene and in dialects of the Levant. In San’ani, it is restricted to loan words from other dialects of Arabic, particularly Cairene.[34] In Cairene, the *faᶜlān* adjective is generally derived from intransitive verbs, and indicates the attaining of a state by the subject.[35] The *faᶜlān* adjective is another example of a level-one morphological process which involves affixation as well as templatic change. The fact that there is a templatic change, though small, indicates that the *faᶜlān* adjective constitutes a level-one process. In addition, a number of *faᶜlān* forms may take a broken plural pattern as an alternative to the sound plural ending, as in *sakrān* pl. *sakāra* ‘intoxicated, drunk’. Since broken plural formation is also a level-one process, and since level-one processes precede level-two processes, this indicates that the *faᶜlān* adjective is derived in the level-one morphology. A semantic reason for considering derivation of the *faᶜlān* adjective to be a level-one process is that a number of intransitive form I verbs take the *faᶜlān* adjective as the active participle either alongside, or in place of, the *fāᶜil* active participle. This indicates that *faᶜlān* is derived at the same level as the *fāᶜil* active participle. Consider the examples of *faᶜlān* active participles in (65).

(65) *taᶜbān* ‘tired’ (from *tiᶜib* ‘to become tired’)
xadlān ‘numb’ (from *xidil* ‘to become numb’)
daryān ‘aware, conscious’ (from *diri* ‘to become aware’)
xawyān ‘empty’ (from *xiwi* ‘to become empty’)
xazyān ‘shy’ (from *xizi* ‘to become shy’)
kabrān ‘increased in size’ (from *kibir* ‘to increase in size’)

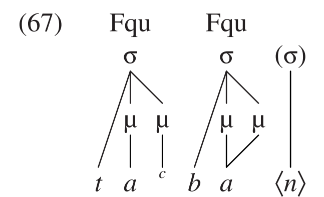
The *faᶜlān* adjective is derived by mapping the consonants of an intransitive verb to the consonantal slots of a monosyllabic bimoraic template (a trochaic foot) and suffixation of *-ān*—see (66).

[34] The few examples of San’ani *faᶜlān* adjectives include *malān* ‘full’, *ġalṭān* ‘wrong’, *jamdān* ‘fixed, motionless’ and *galgān* ‘worried’. However, the original forms of the latter two adjectives, *jāmid* and *galig*, are more common than the *-ān* variants, and *ġalṭān* is probably an import.

[35] In Standard Arabic, the *faᶜlān* adjective is principally derived from *faᶜila* intransitive verbs: *ᶜaṭšān* ‘thirsty’ from *ᶜaṭiša* ‘to be/become thirsty’ and *ġaḍbān* ‘angry’ from *ġaḍiba* ‘to be/become angry’ (Wright 1971: 135–6).

(66)


This results in a word comprising two trochaic feet:

(67)


The vocalic melody /a/ of the stem (CaCC) could in theory either be lexically specified[36] or be acquired by spreading from the *-ān* suffix. Since *-ān* is attested in other areas of level-one morphology, while *-īn* and *-ūn* are not attested at this level, I assume that *-ān* is a complex suffix in both dialects and is not analysable as two separate elements—a bimoraic template and the vocalic melody /a/. In Cairene, *-ān* is a common form I verbal noun ending where the pattern is CaCaC + *ān*:

(68) *xafasān* verbal noun of *xafas* 'to thrust down'
ḥamaḍān verbal noun of *ḥimiḍ* ~ *ḥumuḍ* 'to go bad'
rataᶜān verbal noun of *rataᶜ* 'to indulge oneself'
raxaxān verbal noun of *raxx* 'to pour down'
zaʔafān verbal noun of *zaʔaf* 'to throw'

-ān is attested in other singular nouns derived from triliteral verbs:

(69) *bunyān* 'structure' (root /b-n-y/)
buhtān 'falsehood' (root /b-h-t/)
zaraʔān 'blueness' (root /z-r-ʔ/)
mazazān 'sourness, tartness' (root /m-z/)

-ān is attested in adjectives and nouns derived from quadriliteral verbs:

(70) *bahragān* 'decorative head fringes of a bride' (from *bahrag* 'to doll up')
turgumān 'dragoman, authorized tourist guide' (from *targim* 'to interpret')
mazlaʔān 'railway crossing; (naut.) slip'

Finally, *-ān* functions as a suffix to the monosyllabic broken plural pattern Cu/iCC + *ān* (see Section 6.6), which is derived from a number of different singular patterns (Aboul-Fetouh 1969: 60)—see (71).

[36] It is possible that /a/ is the unmarked vocalic melody of adjectives (Woidich p.c.).

(71)
gidyān	'he-goats' (plural of *gidy*)
girān	'neighbours' (plural of *gār*)
ġizlān	'deer' (plural of *ġazāl*)
fityān	'youths, lads' (plural of *fata*)
ʔumṣān	'shirts' (plural of *ʔamīṣ*)
ḥulʔān	'rings' (plural of *ḥalaʔa*)
ṣubyān	'youths, lads' (plural of *ṣabi*)

San'ani has far fewer *-ān* verbal nouns than Cairene (examples include *sarayān* 'diffusion' and *ᶜuṣyān* 'disobedience'), but it does have a large number of broken plurals ending in *-ān*, again from a number of different singular patterns.

(72)
xizgān	'holes' (plural of *xuzgī*)
ᶜizbān	'unmarried' (plural of *ᶜazab*)
ṯirmān	'toothless' (plural of *aṯram*)
šibbān	'youths' (plural of *šabāb/šābb*)
jīrān	'neighbours' (plural of *jār*)
guṣbān	'pipe' (plural of *gaṣabuh*)
wudyān	'valley' (plural of *wādī*)
ᶜamyān	'blind' (plural of *aᶜmā*)

6.5.7.3 *Verbal participles of derived verbs*

Cairene rarely makes any phonological distinction between active and passive participles of derived verbs.[37] If the semantics of a verb allow it to take both an active and a passive participle, it is often the syntactic or pragmatic context alone that determines the voice of the participle. On the whole, verbal participles of derived finite verbs are derived by prefixation of the participle prefix *mi-* (rarer *mu-*) to the finite stem. Where the vocalic melody of the imperfect verb differs from that of the perfect verb, as in forms IV, VII, VIII, some IX, and some X tokens, *mi-* is prefixed to the imperfect stem. Derivation of the verbal participles of derived verbs in Cairene is, therefore, an instance of concatenative level-one morphology. Consider the examples in (73). In case of alternant patterns, the most common alternant is given first (prosthetic vowels added in the perfect of forms V–X).

(73)
Form	*Perfect*	*Imperfect*	*Participle*	*Gloss*
II	*sabbik*	*yisabbik*	*misabbik*	'to do something well'
	zahhaʔ	*yizahhaʔ*	*mizahhaʔ*	'to cause to be fed up'
III	*zāyid*	*yizāyid*	*mizāyid*	'to bid'
IV	*ʔaᶜgab*	*yuᶜgib*	*muᶜgib*	'to please'
V	*itzayyif ~ izzayyif*	*yitzayyif*	*mitzayyif*	'to be counterfeited'
	itsaʔʔa ~ issaʔʔa	*yitsaʔʔi*	*mitsaʔʔi*	'to be prepared'
VI	*itsāᶜid ~ issāᶜid*	*yitsāᶜid*	*mitsāᶜid*	'to be helped, assisted'
	itzāwar ~ izzāwar	*yitzāwir*	*mitzāwir*	'to exchange visits'

[37] With the exception of participles derived from IV and X form hollow verbs, as discussed above.

VII	*itzanaʔ ~ izzanaʔ*	*yitziniʔ*	*mitziniʔ*	'to be disgraced, shamed'
	itzāḥ ~ izzāḥ	*yitzāḥ*	*mitzāḥ*	'to be shifted'
	itzann ~ izzann	*yitzann*	*mitzann*	'to be given a beating'
VIII	*istalaf*	*yistilif*	*mistilif*	'to borrow'
	ištarr	*yištarr*	*mištarr*	'to ruminate, chew the cud'
IX	*ismarr*	*yismirr*	*mismirr*	'to be, become brown, tanned'
	iṣla^{cc}	*yiṣla*^{cc}	*miṣla*^{cc}	'to be, become bald'
X	*istasʔa*^{c}	*yistasʔa*^{c}	*mistasʔa*^{c}	'to consider cold or chilly'
	ista^{c}*bid*	*yista*^{c}*bid*	*mista*^{c}*bid*	'to treat as a slave'
	istazall	*yistizill*	*mistizill*	'to subjugate'
	istaḍāf	*yistiḍīf*	*mistiḍīf*	'to have as a guest'

In contrast to Cairene, San'ani continues to maintain a phonological distinction between the active and the passive participles in derived verb forms. The vocalic melody of the active participle stem is the same as that of the basic form I active participle /a-i/ (see (57)), while that of the passive participle is /a/. Today, the vowel of the participle prefix varies between /u/ and /i/ in all derived forms, with the realization often depending on the identity of the first consonant of the stem (Watson 1993*b*: 437–44).[38] The patterns for derived active and passive participles are given in (74).

(74)

Form	*Active participle*	*Passive participle*
II	*mufa*^{cc}*il ~ mifa*^{cc}*il*	*mufa*^{cc}*al ~ mifa*^{cc}*al*
III	*mufā*^{c}*il ~ mifā*^{c}*il*	*mufā*^{c}*al ~ mifā*^{c}*al*
IV	*muf*^{c}*il ~ mif*^{c}*il*	*muf*^{c}*al ~ mif*^{c}*al*
V	*mutfa*^{cc}*il ~ mitfa*^{cc}*il*	*mutfa*^{cc}*al ~ mitfa*^{cc}*al*
VI	*mutfā*^{c}*il ~ mitfā*^{c}*il*	*mutfā*^{c}*al ~ mitfā*^{c}*al*
VII	*munfa*^{c}*il ~ minfa*^{c}*il*	*munfa*^{c}*al ~ minfa*^{c}*al*
VIII	*mufta*^{c}*il ~ mifta*^{c}*il*	*mufta*^{c}*al ~ mifta*^{c}*al*
X	*mustaf*^{c}*il ~ mistaf*^{c}*il*	*mustaf*^{c}*al ~ mistaf*^{c}*al*

6.5.7.4 *Verbal nouns of derived verbs*

Excepting minor differences in verbal nouns of some derived weak verbs, the verbal noun templates in Cairene are identical to those of Standard Arabic. The verbal noun of form II third weak verbs has been 'Egyptianized' and is not taCCiya of Standard Arabic,[39] but taCCiyya, with *y*-strengthening (cf. Section 8.1.2). The *t* + I forms do not usually take a separate verbal noun (cf. above).

[38] Describing San'ani in the 1930s, Rossi (1939: 30–1) claims the prefix vowel of the derived active participle is realized as [u] for forms III, V, VI, and VII, and varies between [u] and [i] in form II.

[39] The nominal feminine ending *-a* is traditionally analysed as compensating for the loss (or non-realization) of the final weak root consonant (Wright 1971: 118).

(75)

Form	Perfect	Verbal noun	Gloss
II	*sabbik*	*tasbīk*	'to do something well'
	sadda	*tasdiyya*	'to thread (a warp)'
III	*ᶜātib*	*ᶜitāb ~ miᶜatba*	'to rebuke gently'
	ᶜāriḍ	*muᶜarḍa*	'to object, protest'
	šāba	*mišabiyya*	'to reach up, try to reach'
IV	*ʔaᶜgab*	*ʔiᶜgāb*	'to please'
V	*itzayyif ~ izzayyif*	*tazayyuf*	'to be counterfeited'
	itᶜadda	*taᶜaddi*[40]	'to excel, surpass'
VI	*itsāᶜid ~ issāᶜid*	*tasāᶜud*	'to be helped, assisted'
	itḍāha ~ iḍḍāha	*taḍāhi*[41]	'to be checked for verification'
VII	*inšaġal*	*inšiġāl*	'to keep busy'
VIII	*istalaf*	*istilāf*	'to borrow'
	ištarr	*ištirār*	'to ruminate, chew the cud'
IX	*ismarr*	*ismirār*	'to be, become brown, tanned'
X	*istasʔaᶜ*	*istisʔāᶜ*	'to consider cold or chilly'
	istazall	*istizlāl*	'to subjugate'
	istaḍāf	*istiḍāfa*	'to have as a guest'

As in Standard Arabic and the vast majority of other modern Arabic dialects, most verbal nouns (II, III, IV, VII, VIII, IX, X) are formed by lengthening the vowel of the final syllable through final-mora reduplication (see (60)).[42] Of these, the majority (most III tokens, IV, VII, VIII, IX, and X) have the verbal noun vocalic melody /i-a/ (the mirror-image of the active participle vocalic melody). Final-mora reduplication is attested in other areas of the morphology: in the derivation of the verbal noun of many form I verbs (for example, *xurūg* 'exit, going out', *duxūl* 'entry, going in', *dirās-a* 'learning'), the passive participle of form I verbs (see Section 6.5.7.1), the traditional noun of instrument (miCCaaC/muCCaaC), and a large number of de-verbal adjectives and nouns of the patterns CVCVVC and CVCCVVC (for instance, *saᶜīd* 'happy', *safīr* 'ambassador', *simīn* 'fat', *sikkīr* 'alcoholic', *saffāk* 'bloodthirsty'). Final-mora reduplication for verbal nouns is represented in (76).

(76) *Final-mora reduplication* (*verbal noun*)



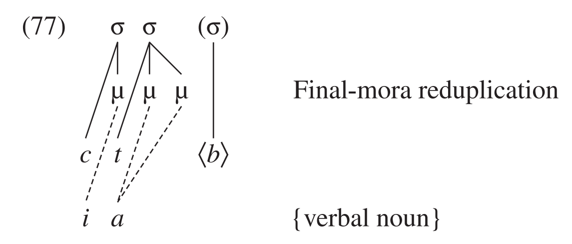
The form III verbal noun *ᶜitāb* is derived from its finite verb cognate *ᶜātib* 'to rebuke' through initial-mora deletion and final-mora reduplication, and by association of the verbal noun vocalic melody /i-a/ with the moraic slots of the template,

[40] No stem-final *-u* in the dialects. [41] No stem-final *-u* in the dialects.

[42] The analysis here differs from McCarthy and Prince (1990*a*: 37), in which they propose setting up a monosyllabic bimoraic non-finite verb suffix which contrasts with their monomoraic finite verb suffix in (31).

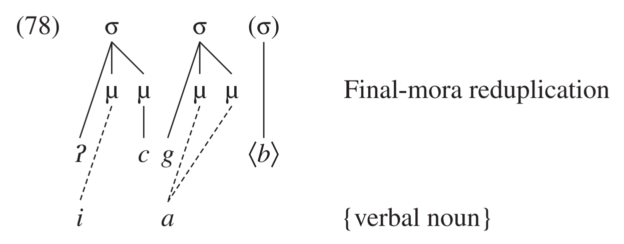
delinking the vocalic melody of the finite verb. The latter part of this process is represented in (77).

(77)



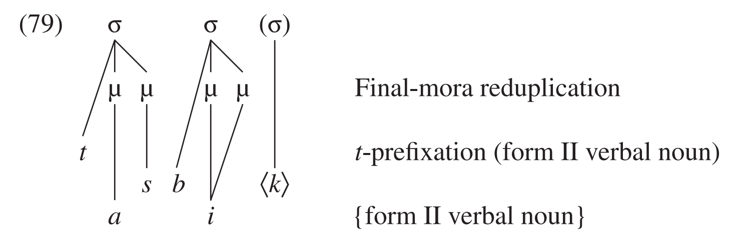
The form IV verbal noun *ʔi*^{c}*gāb* is derived from its finite verb cognate *ʔa*^{c}*gab* ‘to please’ through final-mora reduplication and association of the verbal noun vocalic melody /i-a/:

(78)



The form II verbal noun pattern taCCiiC differs from that of all other forms in that it takes a non-moraic prefix *t-* which does not constitute part of the finite verb, but which is reminiscent of the Standard Arabic form V and VI detransitivizing prefix; its vocalic melody, /a-i/, is also the mirror-image of that of most other derived verbal nouns; and it fails to exhibit the medial gemination of the finite verb. The representation of Cairene *taḥbīs*, verbal noun of *ḥabbis* ‘to confine, lock up’ is given in (79).

(79)

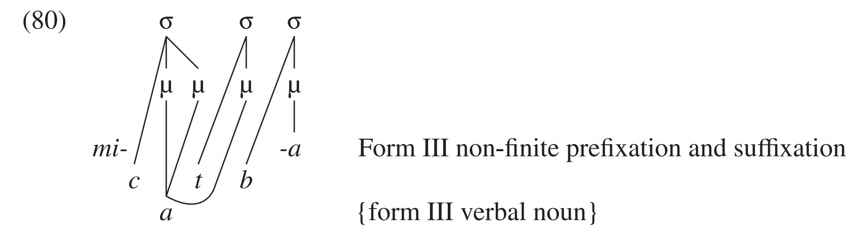


The alternative verbal noun pattern of form III (miCaaCaCa ~ muCaaCaCa) differs from most other verbal noun patterns in that it does not undergo the final-mora reduplication rule. In addition, it takes a prefix *mi-* or, less commonly, *mu-*, and a suffix *-a*. Apart from the fact that the verbal noun vocalic melody /a/ differs from that of the finite verb /a-i/ in Cairene,[43] derivation of the form III verbal noun

[43] But not from the vocalic melody of the finite form III verb in San’ani.

is an instance of entirely concatenative level-one morphology. Cairene *mi^{c}atba* ‘reproach, rebuke’ is derived as in (80).

(80)



In Cairene, -*a*- is subject to syncope in the environment CVVCaCV (see Section 4.4.2.1), and the long vowel reduced before the resulting consonant cluster through CSS (see Section 4.4.1.3) to give, in this case, *mi^{c}atba* ‘reproach, rebuke’.

As for form III muCaaCaCa, the verbal nouns of forms V (taCaCCuC) and VI (taCaaCuC) also fail to undergo final-mora reduplication, and the template of the verbal noun stem is identical to that of the finite verb (CVCCVC). In this case, however, the derivation of the verbal noun is not so obviously an instance of concatenative morphology: firstly, these patterns have neither the vocalic melody of the regular verbal noun patterns (/i-a/), nor the vocalic melody of their finite cognates (/a-a/ or /a-i/): and secondly, form V and VII verbal nouns begin with a non-moraic *t*, while their finite verb cognates begin with a moraic *t*-:

(81) Form V

itzayyif ~ *izzayyif*	*tazayyuf*	‘to be counterfeited’
it^{c}addid	*ta^{c}addud*	‘to become numerous, multiply’
it^{c}adda	*ta^{c}addi*[44]	‘to excel, surpass’

Form VI

it^{c}ādil	*ta^{c}ādul*	‘to come out even, draw’
it^{c}āriḍ	*ta^{c}āruḍ*	‘to stand in contradiction, conflict’

It appears that form V and VI verbal nouns have either been borrowed directly from Standard Arabic, which shares the patterns cited above, or that they have specific derivative patterns taCaCCuC and taCaaCuC into which all form V and form VI finite verbs are inserted. Since the few form V and form VI verbal nouns tend to be high-style lexemes, I assume that Cairene form V and VI verbal nouns are lexical borrowings from Standard Arabic.[45]

The verbal noun patterns of derived verbs in San’ani are identical to those for Cairene in forms III,[46] IV, VI, VII, VIII, and X. The common San’ani patterns for

[44] No stem-final -*u*.

[45] I assume for Standard Arabic (and for Cairene should it emerge that form V and VI verbal noun formation continues to be active) that the vocalic melody associates from left to right within the stem of the verbal noun (CaCCuC and CaaCuC), and that the leftmost vowel then spreads into the prefix.

[46] With the exception that the prefixed form is realized with a medial long vowel and syncope does not remove the following short vowel. While Cairene has patterns *fi^{c}āl* and *mifa^{c}la* ~ *mufa^{c}la*, San’ani has the patterns *fi^{c}āl* and *mufā^{c}ala*.

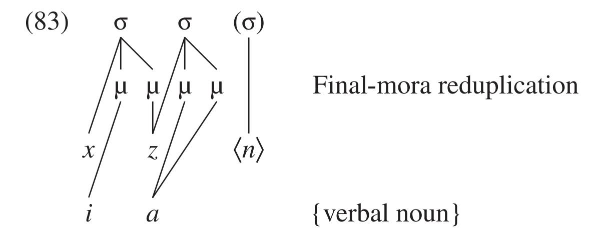
the form II and V verbal nouns, however, involve final-mora reduplication and the unmarked verbal noun vocalic melody /i-a/:[47, 48]

(82)

	Perfect	Verbal noun	Gloss
Form II	*xazzan*	*xizzān*	'to chew [gat], store'
	ḥarrag	*ḥirrāg*	'to burn'
	karraḏ̣	*kirrāḏ̣*	'to deliberately obstruct'
Form V	*taḥarrak*	*tiḥirrāk*	'to move'
	tibannan	*tibinnān*	'to eat well'
	timaššā	*timiššā*	'to go for a walk'

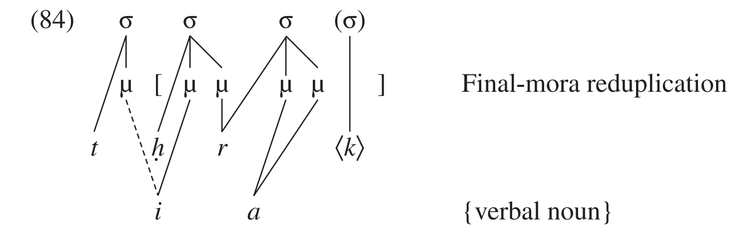
The San'ani form II verbal noun *xizzān* is derived from its finite cognate *xazzan* through final mora reduplication and association of the unmarked verbal noun vocalic melody with the remaining moraic slots of the template:

(83)



Form V verbal nouns are also derived from the finite verb through final-mora reduplication. I then assume that the verbal noun vocalic melody associates from left to right within the stem (*ḥirrāk*) and that the initial vocalic element /i/ subsequently associates leftwards into the remaining moraic slot on the template. This is illustrated in the derivation of *tiḥirrāk* from *taḥarrak* in (84).

(84)



[47] The patterns for form II (CiCCaaC) and the form V (tiCiCCaaC) are given in Wright (1971) as posssible Standard Arabic form II and V verbal noun patterns. CiCCaaC is the original form II infinitive (Wright 1971*i*: 116).

[48] The unmarked template for the form I quadriliteral verbal noun in San'ani is identical to that of the form II triliteral verbal noun, and the one for the form II quadriliteral verbal noun is identical to that of the form V triliteral verbal noun: *ḥafḥaf* 'to bark' and *ġaswal* 'to wash up' have the verbal nouns *ḥifḥāf* and *ġiswāl* alongside *ḥafḥafih* and *ġaswalih*, while *timaᶜḏar* 'to apologize' has the verbal noun *timiᶜḏār*.

6.6 LEVEL-ONE NOMINAL MORPHOLOGY

Under level-one nominal morphology, I consider the formation of broken plurals in the two dialects. McCarthy and Prince's observations for broken plural formation in Standard Arabic apply largely to the dialects examined here. This process confirms the third thesis of Prosodic Morphology in (19c), namely that 'morphological operations may be circumscribed by prosodic criteria as well as by the more familiar morphological ones. In particular, the *minimal word* within a domain may be selected as the locus of morphological transformation in lieu of the whole domain.' Thus, a morphological operation may select a prosodic unit for the locus of morphological transformation which is only a part and not the whole of the morpheme to which that morphological transformation applies.

There are a large number of broken plural patterns in Cairene and San'ani. When the patterns are considered in terms of foot types, however, they fall into three major patterns: iambic, trochaic, and monosyllabic, with an additional 'other' set (McCarthy and Prince 1990*b*: 213 for Standard Arabic). In (85a) broken plural patterns for Cairene are listed, in (85b) those for San'ani.

(85) (a) Cairene plural patterns

Iambic	*Trochaic*	*Monosyllabic*	*Other*
/CaCaaC/*	CuCaC ~ CiCaC	CuCC	CuCCaC
CiCaaC ~ /CiCaaC/*	CuCuC	CuCC + aan	CuCCaaC
CiCaaC + a	CuCaC	CiCC	CiCCaaC + a
CaCaaC + a	CiCaC ~ CiCaC + a	CiCC + aan	
CuCaaC	CiCiC + a ~ /CiCiC + a/*	CaCC + aan	
CiCuuC ~ CuCuuC	CuCuC + a		
CiCiiC	/CaCuC + a/*		
CaCaaCiC	CuCaC + a		
CaCaaCiC + a[49]	CaCaC		
CaCaaCiiC[50]	CaCaC + a		
CawaaCiC	/CuCuC/ ~ /CiCuC/ ~ /CaCuC/*		
CawaaCiiC[51]			
CaCaayiC			

(b) San'ani plural patterns

Iambic	*Trochaic*	*Monosyllabic*	*Other*
/CaCaaC/*	CiCaC ~ CuCaC	CuCC	CaCCaaC + ih
CuCuuC ~ CiCuuC	CaCaC	CuCC + aan	CuCCaaC
CaCiiC	CiCiC	CiCC CiCCaaC	
CiCaaC ~ CuCaaC	CuCuC	CiCC + aan	CiCwaC ~ CuCwaC
CaCaaC + aa	CuCaC + aa	CaCC + aan	

[49] Realized as CaCaCCa through high vowel syncope (see Section 4.4.2.1) and CSS (see Section 4.4.1.3).

[50] Realized as CaCaCiiC with shortening of the unstressed long vowel (see Section 9.1.1).

[51] Realized as CawaCiiC with shortening of the unstressed long vowel (see Section 9.1.1).

CaCaaC + iin	/CaCiC/* ~ /CaCuC/*	CaCC + ih
CiCiiC ~ CuCiiC	/CaCiC + ih/*	CuCC + ih
/CaCuuC/*	/CaCaC + ih/*	
CaCaaCiC		
CaCaaCiC + ih		
CaCaaCiiC		
CawaaCiC		
CawaaCiiC		
CaCaayiC		

* As in Levy (1971) and McCarthy and Prince (1990*b*: 213, 279), /CaCaaC/ represents surface aCCaaC, /CaCiC/ represents surface aCCiC, etc. The surface forms are derived by a morphological rule of stem-initial Ca- metathesis. In Cairene, Ca- metathesis has been widened to include Ci- and Cu- in /CiCiC + a/, /CuCuC/, etc. In contrast to CuCaaC and CiCaaC plurals, very few instances of non-metathesized CaCaaC plurals exist either in Standard Arabic or in the dialects considered here. The example McCarthy and Prince give of a CaCaaC plural, *saḥaab* 'clouds' (1990*b*: 218) is a collective and not a plural, and is given as such in Wehr's dictionary (Wehr 1974). *Šabāb* 'youths' is given as one of three possible plural patterns for *šābb* 'youth' in Wehr, but is also listed as a collective.

The key invariant uniting the plurals in the leftmost column is the initial iambic sequence CVCVV +. Trochaic and monosyllabic broken plural patterns in columns two and three impose a trochee or monosyllable (CVCC and therefore also a trochee) template to which the root associates. Only the 'other' patterns fail to constitute a metrical foot.

In terms of the occurrence of the various plural types, the monosyllabic patterns are rare in both dialects, as they are in Standard Arabic. CuCC (~ CiCC) is almost exclusively the plural pattern of aCCaC adjectives in both dialects, as in: *asmar–sumr* 'brown', *aḥmar–ḥumr* 'red', *abyaḍ–bīḍ* 'white' (SA), *agrab–gurb* 'mangy' (CA); and although CVCC + aan derives the plural from a variety of singular patterns (see Section 6.5.7.2), the actual number of items involved is relatively few. Of the 'other' patterns, CuCCaaC and CiCCaaC are generally restricted to lexicalized CaaCiC participles, as in *kātib–kuttāb* 'writer/s', *ḥākim–ḥukkām* 'ruler/s, judge/s', Cairene *rāgil–riggāl-a* 'man/men' and *sāyis–siyyās~suyyās* 'groom/s', and San'ani *jāhil–juhhāl* 'child/children', (^{c}*āyil*)–^{c}*iyyāl* 'boy/s'; and the anti-iambic pattern CiCwaC ~ CuCwaC in San'ani derives the plural of a few CaCiiC and CaCuuC singulars, as in *šarīṭ–širwaṭ* 'cassette/s', *nagīl–nigwal* 'mountain pass/es', *ṭarīg–ṭurwag* 'road/s', *safūd–sifwad* 'wooden axle/s'. The trochaic patterns are predictable in some lexical classes in both dialects. Cairene CiCiC-a, for example, is the plural pattern today of several CuCaaC and CiCaaC singulars and a few CVCVC singulars, as in *ḥuṣān–ḥiṣin-a* 'horse/s', *lisān–lisina* 'tongue/s', *ligām–ligim-a* 'bridle/s', *ġurāb–ġirib-a* 'crow/s', *sabat–sibit-a* 'basket/s', *ḥanaš–ḥiniš-a* 'snake/s'; and CuCaC, CiCaC, and CiCiC are the plural patterns of many CVCC-a/CVCC-ih singulars in both dialects, as in Cairene *ḥidw-a–ḥidaw* 'horseshoe', *ḥuʔn-a–ḥuʔan* 'injection', and San'ani *nukt-ih–nukat* 'joke', *sufr-ih–sufar* 'dining table', *li*^{c}*b-ih–li*^{c}*ib* 'game/s'. In contrast to the monosyllabic and trochaic patterns, the iambic pattern derives the plural of a very wide range of singulars and extents to loan words far more regularly than the other patterns. Examples appear in (86).

(86)

Singular pattern	Singular	Plural	Gloss
CVCC	*bayt*	*buyūt*	'house' (SA)
	baḥr	*biḥār*	'sea' (SA)
	gahw-ih	*gahāwī*	'coffee' (SA)
	widn	*widān*	'ear' (CA)
	wirk	*wirāk* ~ *warāk*†	'hip' (CA)
	kilw-a	*kalāwi*	'kidney' (CA)
	bikr	*bakāri*	'first born' (CA)
CVCVC	*jabal*	*jibāl*	'mountain' (SA)
	galam	*galām*†	'pen' (SA)
	gamal	*gimāl*	'camel' (CA)
	watar	*watār*†	'tendon' (CA)
CVVCV(V)C	*dāyir*	*dawāyir*	'key' (SA)
	gānūn	*gawānīn*	'law' (SA)
	ḥārik	*ḥawārik*	'withers (of a horse)' (CA)
CVCVVC	*kabīr*	*kubār*	'big, old' (SA)
	madā^c-ah	*madāyi^c*	'waterpipe' (SA)
	gamīl	*gumāl*	'beautiful' (CA)
	ḥazīn	*ḥazān-a*	'sad' (CA)
	gazīr-a	*gazāyir*	'island' (CA)
CVCCV(V)(C)	*rajjāl*	*rijāl*	'man' (SA)
	kitlī	*katālī*	'kettle, teapot' (SA)
	taksī	*takāsī*	'taxi' (SA)
	bazbūz	*bazābīz*	'spout of kettle' (SA)
	madwid	*madāwid*	'manger' (CA)
	ḥanṭūr	*ḥanaṭīr**	'horse-drawn cab' (CA)

†These forms appear as *awrāk*, *awtār*, and *aglām* by Ca- metathesis (85).
*From *ḥanāṭīr*, via unstressed long vowel shortening (see Section 9.1.1).

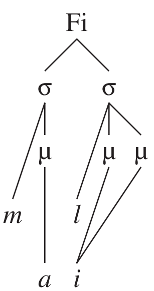
For Standard Arabic, McCarthy and Prince show that the iambic broken plural is derived in the following way: the minimal word (a quantitative trochee, Fqu) is parsed out from the left-edge of the singular noun and mapped onto an iambic template (Fi). The residue of the singular (the portion which remains after Fqu has been parsed out) is then added back in the plural template, and remains prosodically unchanged. In minimal bimoraic nouns and in a few non-minimal nouns and adjectives (the marked case), the vocalic melody of the plural is lexically specified (as /a/, /i-a/, /u-a/, /u/, or /i/). In a few bimoraic nouns and non-minimal nouns (the unmarked case), the vocalic melody of the plural is /a-i/. The unmarked vocalic melody of the broken plural is thus the mirror image of the vocalic melody of derived verbal nouns (see Section 6.5.7.4).

In the following paragraphs I begin by considering the derivation of an iambic plural with a marked vocalic melody from a minimal (bimoraic) singular. I then consider derivations of plurals of non-minimal singulars which take the unmarked vocalic melody /a-i/. Within this category, I examine plural derivations from singu-

lars which end in a light (CVC) syllable and from singulars which end in a heavy (CVVC) syllable. I then discuss plural derivation from singulars with an initial long vowel (CVV), and plural derivation from singulars of the pattern CVCVVC. Finally, I look at bimoraic singulars which take the vocalic melody /a-i/ in the plural.

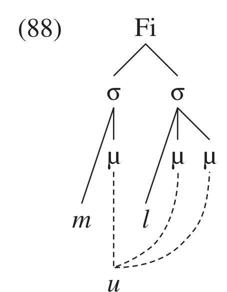
Let us look first at the derivation of the plural of the bimoraic noun *malik* 'king', attested in both Cairene and San'ani, which has the marked plural vocalic melody /u/.

(87) Fqu (*mali)* is parsed out from the singular and mapped to Fi. The consonants associate with the obligatory onset slots:



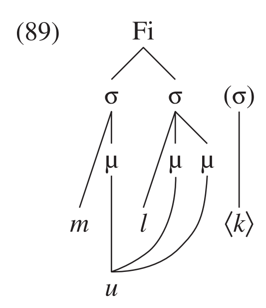
The plural vocalic melody (/u/ in this case) is mapped on to the moraic slots of the plural template in a 'feature-changing' manner, overwriting the original melodic material of the base (/a-i/) (McCarthy and Prince 1990*b*: 245–7):

(88)



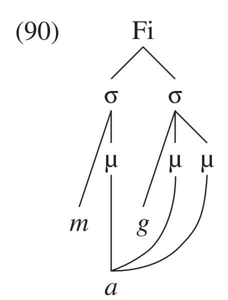
The residue of the singular, /k/, remains prosodically unchanged and is right-concatenated to the iambic foot, yielding *mulūk* 'kings'.

(89)



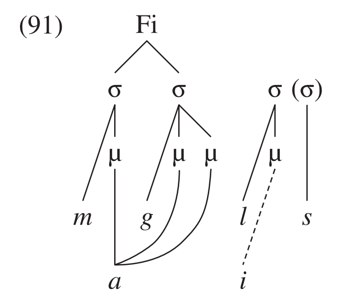
Let us look now at plurals of non-minimal nouns which take the unmarked /a-i/ plural melody. In the case of a quadriconsonantal singular with a final CVC syllable, such as Cairene *maglis* 'council' (San'ani *majlis*), Fqu (in this case, *mag*/*maj*) is parsed from the word and mapped onto Fi.

(90)



The vocalic melody associates as follows: /a/ of the melody associates with the moraic slots of the iambic template, overwriting the vocalic melody of the singular (vacuously in this case, since the melody of the singular is /a/). The residue of the parsed-out word, a CVC syllable, remains prosodically unchanged, and is right-concatenated to the iamb. The remainder of the plural vocalic melody, /i/, associates with the moraic slots of the residue, overwriting the melody of the singular (again vacuously in the case of *maglis*), to yield *magālis* 'councils'.

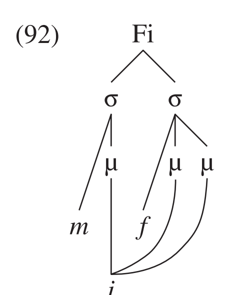
(91)



The prosodic parsing-out of the initial two-mora sequence (the minimal phonological word, though not a word in any other sense as it occurs here) of the singular explains the fact that the first part of the plural is iambic, while the third syllable (if there is a third syllable) remains prosodically unchanged from that of the singular. When a quadriconsonantal singular has a final CVC syllable, this syllable is realized as CVC in the plural (with /i/ of the plural vocalic melody overwriting the original melodic material of the base), as in *maglis–magālis* 'council/s' (CA), *maktab–makātib* 'office/s', *mafraj–mafārij* 'reception room/s' (SA), *bardag–barādig* 'drinking glass/es' (SA). When the residue of a quadriconsonantal singular is CVVC, the final syllable is realized as CVVC in the plural, and /i/ of the plural vocalic melody spreads to fill the two moraic positions, as in *gargūš–garāgīš* 'bonnet/s' (SA), *ḥanṭūr–ḥanaṭīr* 'horse-drawn cab/s' (CA) and

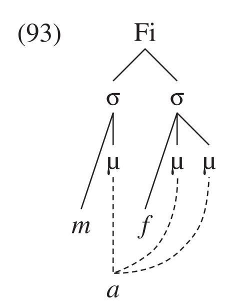
miftāḥ–mafāṭīḥ (*muftāḥ–mafatīḥ* (CA)) 'key/s'. In the derivation of *mafāṭīḥ*, Fqu (*mif*) is parsed from the word and mapped onto Fi:

(92)



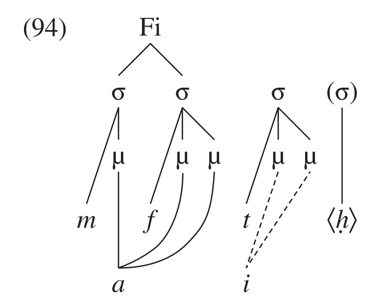
The vocalic melody of the original base is overwritten by /a/ of the plural vocalic melody.

(93)



The residue of the parsed-out word is right-concatenated to the iamb, and is then subject to melodic overwriting by /i/ of the plural melody:

(94)



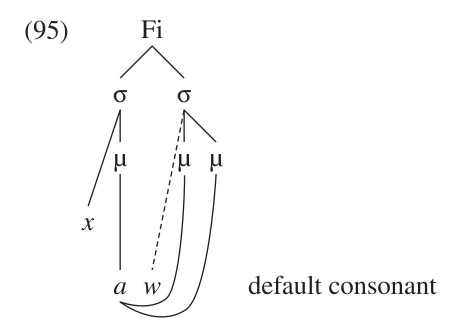
In Cairene, stress is assigned to the rightmost heavy syllable, and the leftmost long vowel is subject to unstressed long vowel shortening (see Section 9.1.1) to produce, in this case, *mafatīḥ*. In San'ani, both long vowels are maintained.

When the singular takes a suffix, such as the feminine *-a* (*-ih* in San'ani) or the singular *-ī* suffix in San'ani (see Section 7.2.4), the suffix is overlooked in the plural and does not count as part of the residue. This is exemplified in Cairene *sil-sil-a* pl. *salāsil* 'chain/s', *maktab-a* pl. *makātib* 'library/ies', *madras-a* pl. *madāris*

'school/s'; and in San'ani *gurdā*ᶜ*-ī* pl. *garādī*ᶜ 'pile/s' *zugzug-ī* pl. *zagāzig* 'alley/s', *muḥguf-ī* pl. *maḥāgif* 'sorghum head/s'.

When the consonantism of the parsed-out Fqu is insufficient to fill the onset slots of Fi, the empty onset is filled by a default consonant /w/ (cf. McCarthy and Prince 1990*b*: 249 for Standard Arabic). In words such as *xātam–xawātim* 'ring/s', *māni*ᶜ*–mawāni*ᶜ 'obstacle/s', *ḥārik–ḥawārik* 'withers (of a horse)' (CA), *gārī–gawārī* 'garry cart/s' (SA), *nādam–nawādim* 'human being/s' (SA) and *gāmūs–gawāmīs* 'dictionary/ies' (SA), the parsed-out material, Fqu, is a consonant plus a long vowel (*xā*, *mā*, *ḥā*, *nā*, *gā*). The consonant associates with the onset of the leftmost syllable. Since the second mora of the singular associates with the second portion of a long vowel rather than a consonant, the rightmost onset of the plural iambic template cannot be filled by the contents of the parsed-out material. To adhere to the requirement that syllables take an initial onset, a default consonant, /w/, associates with the onset of the second syllable. This is exemplified in (95) in the derivation of *xawātim* 'rings'.

(95)



Once the residue becomes accessible and melodic overwriting takes place, the output is *xawātim* 'rings'. The Consonantal Default Rule is given in (96), from McCarthy and Prince (1990*b*: 249):

(96) *Consonantal Default Rule*
0 → *w*, when required by syllabic well-formedness.[52, 53]

The derivation of the iambic plural from singular nouns of the pattern CVCV-VC (+ *a*/*ih*) is a particularly interesting case within Prosodic Morphology. This is because the two-mora unit which is parsed out from the singular corresponds to neither a trochaic foot nor a syllable (McCarthy and Prince 1990*b*: 249–50). Consider the set of examples in (97).

[52] This default rule applies only within the iamb in broken plural derivation. Outside the iamb, a separate default rule applies in Standard Arabic inserting /ʔ/.

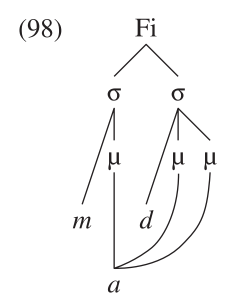
[53] /w/ also functions as a default consonant when sub-minimal stems take a following plural or adjectival suffix. Thus, San'ani *san-ih* 'year', which takes the {feminine plural} suffix *-āt* (see Table 7.2), is made bimoraic by the addition of *-a-* plus an onset /w/ to give *sanawāt* 'years' (cf. also Section 7.3.2).

(97)

	Singular	*Plural*	*Gloss*
CA	*ᶜadīl*	*ᶜadāyil*	'brother-in-law'
CA	*gazīr-a*	*gazāyir*	'island'
CA	*ḥabīb(-a)*	*ḥabāyib*	'loved person'
SA	*ḥarīr*	*ḥarāyir*	'silk'
SA	*xabīr-ih*	*xabāyir*	'(female) friend'
SA	*madāᶜ-ah*	*madāyiᶜ*	'waterpipe'
SA	*sitār-ih*	*satāyir*	'[woman's coloured cloak]'

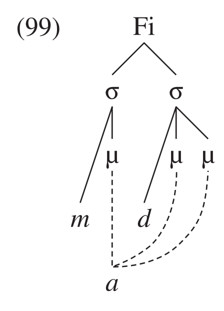
In all other cases of iambic broken plural production, the two-mora unit parsed out from the singular corresponds to a prosodic constituent of the base—the first syllable (***ban****k–bunūk* 'bank/s', ***mak****tab–makātib* 'office/s', ***xā****tam–xawātim* 'ring/s'). When the singular has the templatic pattern CVCVVC, the parsed-out portion of the singular—CVCV—cuts halfway into the second syllable (***ḥabi****ib–ḥabāyib* 'loved person/s', ***gazi****ir-a–gazāyir* 'island/s'). The parsing out of a two-mora unit appears to operate on as yet stressless representations: the parsed-out portion is neither a syllable nor a foot; moreover, the residue of the base is not a syllable either (-VC). McCarthy and Prince cite this as evidence that the parse is achieved on moraic structure alone and not on any other prosodic constituent, confirming that the minimal word in Arabic is defined in terms of moras and not in terms of syllables. Consider the derivation of San'ani *madāyiᶜ* from *madāᶜ-ah*. The initial two-mora portion is parsed from the word and mapped onto Fi:

(98)



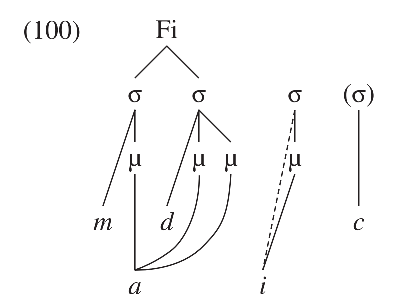
/a/ of the plural melody spreads to the moraic positions in the iamb, in this case vacuously overwriting the original melody of the base:

(99)



The residue of the parsed-out word lacks a potential onset; therefore, the features associated with the rightmost vowel of the plural vocalic melody, /i/, associate with the onset of the final syllable once the residue becomes accessible, to give *y*:[54]

(100)



Finally, let us examine plural formation from bimoraic singulars which take the plural vocalic melody /a-i/. McCarthy and Prince (1990*b*: 246, 250) claim that /i/ of the /a-i/ melody associates to the moraic slots of the residue if and only if the residue contains moraic material. If the residue contains no moraic material, /i/ fails to associate and is subject to Stray Erasure. In this way, they are able to claim that the most common plural pattern of minimal singulars, /CaCaaC/, has the unmarked plural vocalic melody /a-i/ (McCarthy and Prince 1990*b*: 250). /a/ associates with moraic material within the iamb. The residue, a single consonant, is right-concatenated to the iamb. /i/ of the vocalic melody cannot associate due to the absence of moraic material in the residue and is subject to Stray Erasure. According to this analysis, *aḥkām* 'judgements' is derived from *ḥukm* as follows:

(101) *ḥuk* parse out trochee at left edge
ḥukuu map to iambic template
ḥakaa melodic overwriting by /a/
ḥakaam restore residue, Stray Erasure of /i/
aḥkaam Ca- metathesis

However, both Standard Arabic and Cairene and San'ani have a few bimoraic singulars which take plurals with the /a-i/ plural melody, and we know this because the final element of the vocalic melody does surface to the right of the iamb. The vowel /i/ is realized as long in San'ani, which does not accept domain-final short vowels, and as short in Cairene, which does. Examples of such nouns from San'ani include *gahw-ih–gahāwī* 'coffee/s' and *kiliy-ih–kalāwī* 'kidney/s'. Examples from Cairene include *bikr–bakāri* 'first born/s', *raġw-a–raġāwi* 'foam, froth', *raxw–raxāwi* 'whiplash/es' and *ḥasw-a–ḥasāwi* 'pebble/s'. If the final element of the plural vocalic melody were subject to Stray Erasure when the residue contained no moraic material, each of these examples would be realized without final /i/.

[54] In Standard Arabic, the onset to the residue is filled by a glottal stop (cf. McCarthy and Prince 1990*b*: 250). The weakness of the glottal stop has resulted in features associated with the [dorsal] vowel, /i/, associating with the onset in most modern Arabic dialects.

Instead, it appears that /i/ of the plural melody right-concatenates to the iamb when the residue contains no moraic material. Under this analysis, Cairene *bakāri* is derived from *bikr* accordingly:

(102)	*bik*	parse out trochee at left edge
	bikii	map to iambic template
	bakaa	melodic overwriting by /a/
	bakaar	restore residue
	bakaari	right-concatenate /i/

In contrast to the predominance of the /a/ vocalic melody in plurals derived from minimal singulars, /a/ is an uncommon vocalic melody in plurals derived from non-minimal singulars. Cairene has a few *y*-final non-minimal singulars, usually of the pattern CaCiyy-a, which take an iambic plural with the vocalic melody /a/. Examples include *ṣabiyy-a–ṣabāy-a* 'young girls', *xaṭiyy-a–xaṭāy-a* 'sin', *sariyy-a–sarāy-a* 'company/ies of soldiers', and *ra^{c}iyy-a–ra^{c}āy-a* 'flock/s', 'herd/s'. The claim that /CaCaaC/ plurals have the vocalic melody /a-i/ with /i/ subject to Stray Erasure fails to capture the fact that the plural vocalic melody /a-i/ is unmarked in the derivation of plurals of non-minimal singulars, but marked in the derivation of plurals of minimal singulars; and that the plural melody /a/ is unmarked in the derivation of plurals of minimal singulars, but marked in the derivation of plurals of non-minimal singulars.

6.7 CONCLUSION

At the beginning of this chapter, I argued that the prosodic morphology of Cairene and San'ani should be analysed in terms of two morphological levels. I then described a number of level-one processes in the two dialects. In general, level-one processes equate with the nonconcatenative morphology and level-two processes with the concatenative morphology. However, I show that a number of morphological processes which demand to be analysed as level one involve at least a limited degree of concatenation. These include derivation of the form I passive participle, the *fa^{c}lān* adjective, participles of derived verbs, the muCaaCaCa form III verbal noun, and form V and VI verbal nouns. In Cairene, aspects of the non-concatenative morphology appear to be giving way to a concatenative morphology. This is seen in the lack of productivity of form VIII (infix *-t-*) verbs as opposed to the productivity of *t-* prefix verbs, and the fact that the distinction between the passive and active participles of derived verbs—historically marked by a difference in the vocalic melody—is now largely determined by the syntactic or pragmatic context. By contrast, the main non-concatenative processes are maintained in the more conservative dialect of San'ani.

The sheer richness of Arabic non-concatenative morphology and restrictions of space have forced me to limit the coverage of this chapter. Within the section on verbal morphology, I have not dealt in detail with the apophonic passive in San'ani.

Nor have I dealt with the fact that the early loss of the apophonic passive in Cairene has left a gap in the non-concatenative system, a gap which has allowed a purely vowel-based distinction between a closed list of intransitive and transitive form I verbs: in this dialect, a number of form I transitive verbs with the vocalic melody /a/ in the perfect aspect have developed from an earlier form IV verb and now contrast with intransitive verbs with the vocalic melody /i/; to a lesser extent, intransitive verbs appear to have developed from a basic transitive counterpart. Within the section on nominal morphology, I focused exclusively on the formation of the broken plural and did not consider the formation of the diminutive, a decision motivated by the relative rareness of the diminutive in both dialects and the fact that the diminutive in San'ani is restricted to a few lexical items and therefore no longer productive.

7

MORPHOLOGY 2

This chapter examines the level-two morphology. In contrast to level-one morphology, level-two morphology is wholly concatenative, involving suffixes and prefixes which are affixed to the outcome of level-one morphology. In general, level-two morphemes are continuous morphemes which are affixed in a linear order to the stem or word. One exception to this is the discontinuous negative morpheme *ma* . . . *-š* in Cairene and *mā* . . . *-š* in San'ani, which negates verbs, independent pronouns, and preposition + object suffix phrases. Another arguable exception is the imperfect subject markers which are discontinuous for the second and third plural and second feminine singular inflections. However, here we could argue that these markers comprise two elements: in the case of the plural markers, a person prefix (that is, second (*ti-*)/third (*yi-*)) and a plural number suffix in Cairene (*-u* ~ *-um*), plural/gender suffix in San'ani (that is, masculine *-ū*, feminine *-ayn*). The set of verbal level-two morphemes comprises the subject agreement affixes, object suffixes, future and habitual prefixes, and the negators. Basic nominal level-two morphemes comprise the adjectival suffix *-ī*, the adverbial suffix *-an* (mainly in CA), the feminine singular[1] *-ih* (SA), *-a* (CA), the dual *-ayn* (SA), *-ēn* (CA), the masculine and feminine plural endings *-īn* and *-āt*, and the possessive pronoun suffixes.

Cairene has a far richer level-two nominal and adjectival morphology than San'ani, partly because it has a richer supply of native adjectival and nominal suffixes, and partly because it has been influenced by other dialects and languages. Cairo has had a very chequered history. In 1835, a severe plague wiped out at least one third of its population (Woidich 1997: 192, n. 25). The population loss caused by the plague was quickly made up by people from the countryside, mainly from the Delta but also from Upper Egypt. These migrants brought with them their own dialect features. Since the later nineteenth century, Cairo has attracted a huge number of migrants (Woidich 1997: 191–2), leading to further changes in the dialect. Over the centuries, Egypt has also been under the influence of several foreign powers, each of which has left its own linguistic traces. In a few cases, these linguistic traces are not simply lexemes but separable morphemes which are actively used today in noun and adjective formation. The main foreign separable morphemes come from Turkish and include the nominal morphemes *-gi*, *-lik* and *-xāna* and the adjectival morpheme *-li*.

[1] In both dialects, this ending is also used as a nominalizer and in the formation of certain masculine plural forms such as *ʔasātiḏih* (SA), *ʔasatza* (CA) 'professors' (cf. Section 6.6), and *makwagiyya* (CA) 'people who trade in ironing clothes'. For shorthand in Table 7.2, I refer to *-a/-ih* as feminine.

In this chapter I consider first the verbal level-two morphemes, then the basic nominal and adjectival level-two morphemes. Within these sections, I also examine allomorphic variation. Finally, I discuss non-basic nominal and adjectival level-two morphemes in the dialects.

7.1 LEVEL-TWO VERBAL MORPHOLOGY

Table 7.1 (see pp. 178–9) presents level-two verbal morphemes in the two dialects. The morphemes are numbered according to the order in which they are affixed to the stem. Cairene differs from San'ani in that it makes no gender distinction in the second and third person plural subject and object suffixes. San'ani makes a distinction between the verbal prefix used for the first person (*šā-* or ^{c}*ad-* future, *bayn-* habitual/continuous) and that used for all other persons (^{c}*a-* future, *bi-* habitual/ continuous),[2] whereas Cairene makes no such distinction (*ḥa-* future, *bi-* habitual/ continuous for all persons). Cairene differs from San'ani in that it may make a distinction between the negation of a verb with the future or habitual/continuous prefix (in which case the particle *miš*, far less commonly *muš*, may be used)[3] and the negation of a verb which does not have a future or habitual prefix (in which case the discontinuous negator *ma . . . -š* is obligatory, cf. Abdel-Massih 1975: 146).[4]

7.1.1 *Affixation of level-two verbal morphemes*

Consider the examples of ordered affixation of verbal level-two morphemes in Cairene in (1) and San'ani in (2).

(1) (a) Perfect

1. Verb + subject suffix	*daras + t*	'I/you m.s. learnt'
2. Verb + object suffix	*darast + u*	'I/you m.s. learnt it m.'
4. Verb + negator	*ma + darastū + š*	'I/you m.s. did not learn it m.'

(b) Imperfect

1. Verb + subject prefix	*ti + drus*	'you m.s. learn'
2. Verb + object suffix	*tidrus + u*	'you m.s. learn it m.'
3. Verb + future prefix	*ḥa + tidrusu*	'you m.s. will learn it m.'
4. Verb + negator	*miš + ḥa-tidrusu*	'you m.s. will not learn it m.'

[2] In common with a number of other Yemeni dialects spoken in the central region of northern Yemen (Behnstedt 1985: 131, 132).

[3] *Miš ~ muš* is obligatory today with the future prefix.

[4] Aboul-Fetouh (1969) says that *miš* may also occur with the bare imperfect or the perfect (as in *miš yiktib* 'he isn't writing' and *miš katab* 'he didn't write') and that 'the alternation between *ma . . . -š* and *miš* is either in free variation or idiolectal'. There is regional variation as well: in the dialect of Shargiyya province, *miš* + perfect is very common (M. Woidich, p.c.). In contrastive negation and rhetorical questions *miš* may be used with all tenses.

(2) (a) Perfect

1.	Verb + subject suffix	*ʔabsar + t*	'I/you m.s. saw'
2.	Verb + object suffix	*ʔabsart + ak*	'I saw you m.s.'
4.	Verb + negator	*mā + bsartak + š*	'I did not see you m.s.'

(b) Imperfect

1.	Verb + subject prefix	*ti + bsir*	'you m.s. see'
2.	Verb + object suffix	*tibsir + hā*	'you m.s. see her'
3.	Verb + future prefix	^{c}*a + tibsirhā*	'you m.s. will see her'
4.	Verb + negator	*mā +* ^{c}*a-tibsirhā + š*	'you m.s. will not see her'

Invariably in Cairene, and usually in San'ani, a preposition with a pronoun suffix is ordered before the negator and after an object suffix (cf. Section 4.4).

(3) (a) Cairene

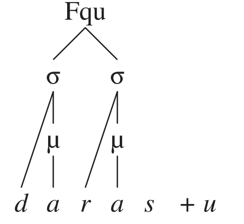
1.	Verb + subject suffix	*ʔul + t*	'I said'
2.	Verb + object suffix	*ʔult + u*	'I said it'
>	Verb + prep. phrase	*ʔultū + lak*	'I told you m.s. it m.'
4.	Verb + negator	*ma + ʔultulak + š*	'I didn't tell you it m.'

(b) San'ani

1.	Verb + subject prefix	*ti + jirr*	'you m.s. take'
2.	Verb + object suffix	*tijirr + hā*	'you m.s. take her/it'
3.	Verb + future prefix	^{c}*a + tijirrahā*	'you m.s. will take her'
>.	Verb + prep. phrase	^{c}*a-tjirrahā + lī*	'you m.s. will take her for me'
4.	Verb + negator	*mā +* ^{c}*a-tjirra-hālī + š*	'you m.s. will not take her for me'

Level-two morphemes are affixed to the outcome of level-one processes. Since level-one processes result minimally in a minimal phonological word, the Prosodic Morphology Hypothesis predicts that level-two morphemes will be affixed to a form which is at least the size of the minimal phonological word—a quantitative (moraic) foot. In the case of Cairene *darasu* 'they learnt' in (4a), the stem is a disyllabic trochee; in the case of *ḥabbu* 'they loved' in (4b), the stem is a monosyllabic trochee.

(4) (a) *Disyllabic trochaic foot*



(b) *Monosyllabic trochaic foot*

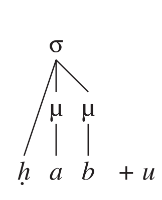


TABLE 7.1 Verbal morphemes

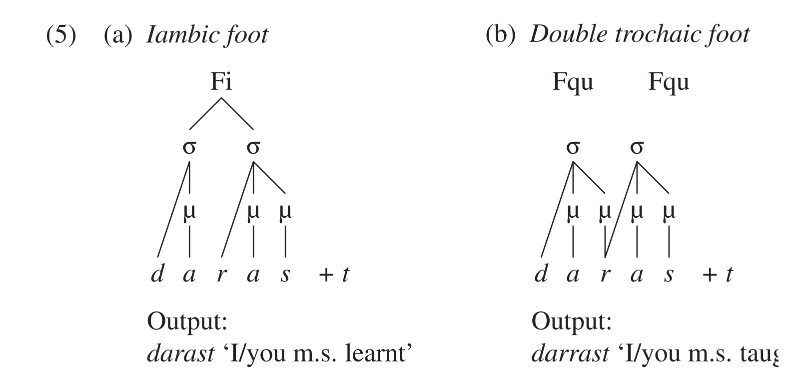
Order	Subject affixes 1		Object suffixes 2	Future/habitual prefixes 3	Negative affixes 4
	SA	CA			
Perfect					
1s	*-t*	*-t*			
2ms	*-t*	*-t*			
2fs	*-tī*	*-ti*			
3ms	-0	-0			
3fs	*-at*	*-it*			
1pl	*-nā*	*-na*			
2mpl	*-tū*	*-tu*			
2fpl	*-tayn*	X			
3mpl	*-ū*	*-u*			
3fpl	*-ayn*	X			
Imperfect					
1s	*a-*	*a-*			
2ms	*ti-*	*ti-*			
2fs	*ti-. . .-ī*	*ti-. . .-i*			
3ms	*yi-*	*yi-*			
3fs	*ti-*	*ti-*			
1pl	*ni-*	*ni-*			
2mpl	*ti-. . .-ū*	*ti-. . .-u*			
2fpl	*ti-. . .-ayn*	X			
3mpl	*yi-. . .-ū*	*yi-. . .-u*[a]			
3fpl	*yi-. . .-āyn*	X			

Order	Subject affixes 1	Object suffixes 2		Future/habitual prefixes 3		Negative affixes 4	
		SA/post-v	CA/post-v				
1s		*-nī*	*-ni*				
2ms		*-ak/-k*	*-ak/-k*				
2fs		*-iš/-š*	*-ik/-ki*				
3ms		*-ih/-h*	*-u/-*(*h*)				
3fs		*-hā*	*-ha*				
1pl		*-nā*	*-na*				
2mpl		*-kum*	*-ku ~ -kum*[b]				
2fpl		*-kin*	X				
3mpl		*-hum*	*-hum*				
3fpl		*-hin*	X				
				SA	CA		
Future 1s				*šā-/*^{c}*ad-*	*ḥa-*		
Other persons				^{c}*a-*	*ḥa-*		
Habitual 1s				*bayn-*	*bi-*		
Other persons				*bi-*	*bi-*		
						SA	CA
						mā . . .-š/šī	*ma- . . .-š*

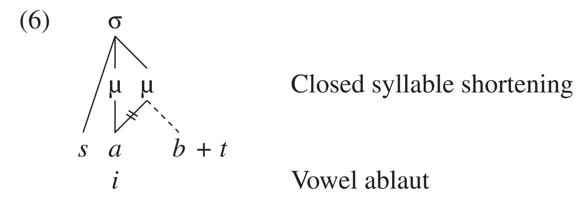
[a]Also often realised as *-um*.

[b]The pronunciation of a final *-m* in *-kum* is a sign of low-level speech (M. Woidich, p.c.).

When consonant-initial subject suffixes are affixed to the perfect verbal stem, the pre-suffixal stem is minimally one iambic foot, and maximally two (monosyllabic) trochaic feet (see Section 6.5.1).



When the pre-consonantal perfect stem exceeds the size of one bimoraic foot but is less than two feet, as in the case of hollow verbs (of the structure CaaC) and doubled verbs (of the structure CaCC), the stem is adapted to conform to the complete foot requirement. For hollow verbs, the stem was reduced historically by CSS (see Section 4.4.1.3) to give a single bimoraic trochee, as in the derivation of Cairene *sibt* 'I/you m.s. left'.



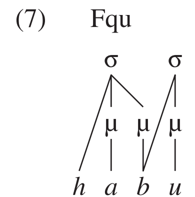
Output: *sibt* 'I/you m.s. left' (cf. *sāb* 'he left')

The process which reduced the pre-consonantal stem of the hollow verb is no longer productive, and today the hollow verb stem has two allomorphs: CVC before consonant-initial subject suffixes and CaaC before null or vowel-initial subject suffixes.

The perfect stem CaCC of doubled verbs has the appearance of a monomoraic trochaic foot. In Standard Arabic, the doubled verb stem has two allomorphs: CaCaC before consonant-initial subject suffixes and CaCC before vowel-initial subject suffixes. It is assumed that the CaCC form is derived from CaCaC by some type of Double Rule (see Section 6.5.6.2). In dialects of Arabic today, the stem of the doubled verb has a single form—CaCC. When vowel-initial subject suffixes are affixed, the geminate consonant is syllabified in the rhyme of the leftmost syllable and as the onset of the rightmost syllable. The pre-vocalic stem is

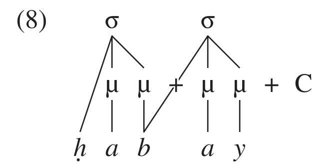
therefore a monosyllabic bimoraic trochee. This is exemplified in Cairene *ḥabbu* 'they loved'.

(7)



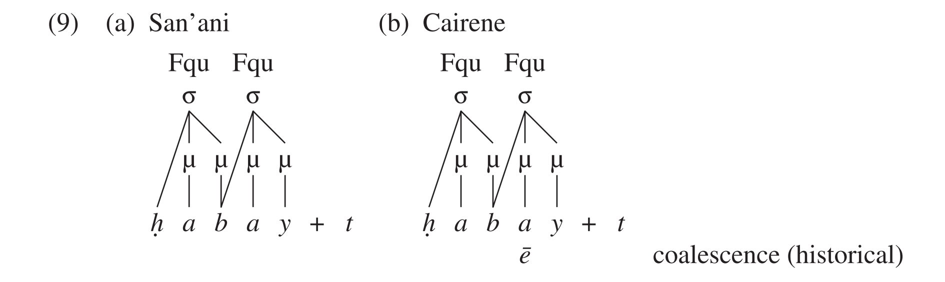
When consonant-initial subject suffixes are affixed to a doubled stem, the stem cannot be reduced as it can in the case of the hollow verb. Instead a special allomorphy rule exists in all dialects to augment the stem template. On analogy with final-weak verbs with the vocalic melody /a/ (see Section 6.5.6.1), a bimoraic adjunct was added which was realized historically as *-*ay*-.

(8)



In Cairene, historical coalescence of *-*ay*- resulted in a long mid vowel /ē/. In San'ani, coalescence did not apply at any stage in the development of the dialect and the allomorphic adjunct continues to be realized as /ay/. The *-*ay*- allomorphy rule results in a disyllabic unit of two trochaic feet. Consider the representations of San'ani *ḥabbayt* in (9a) and Cairene *ḥabbēt* in (9b).

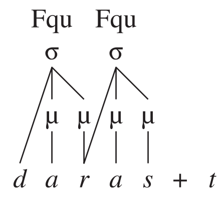
(9)



The suffixed form I doubled verb now shares a double-trochee base with sound and final-weak form II and San'ani form III verbs.[5]

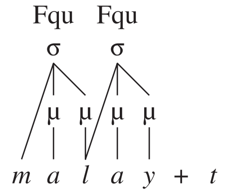
[5] The long vowel in form III verbs in Cairene is subject to unstressed vowel shortening when consonant-initial suffixes are added (see Section 9.1.1). Thus, /*sāfir* + *t*/ is realized as *safirt*. Prosodically, this changes a double trochaic stem into an iambic stem.

(10) (a) *Form II sound*



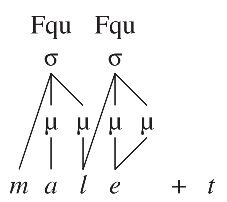
Output:
darrast 'I/you m.s. taught'

(b) *Form II final weak (SA)*



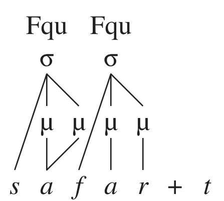
Output:
mallayt 'I/you m.s. filled'

(c) *Form II final weak (CA)*



Output:
mallēt 'I/you m.s. filled'

(11) *Form III (SA)*



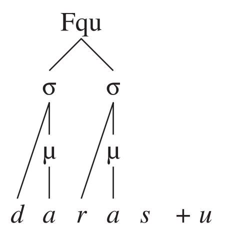
Output:
sāfart 'I/you m.s. travelled

7.1.2 *Affixation of further morphemes*

The remaining concatenative morphemes in level-two morphology also affix minimally to the minimal prosodic word, as exemplified in the affixation of object suffixes in Cairene—see (12).

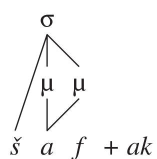
Suffixation is subject to the additional constraint that a morpheme may not be suffixed to a form ending in a short vowel. In San'ani, short morpheme-final vowels are rarely attested, and therefore the constraint on pre-suffixal short vowels applies vacuously. In Cairene, pre-suffix lengthening takes place on affixation of a suffix or clitic to a morpheme ending in a short vowel. Pre-suffix lengthening is represented as mora reduplication (see also Section 8.1.1), as in (13).

(12) (a) *Disyllabic bimoraic trochee* (b) *Monosyllabic bimoraic trochee*



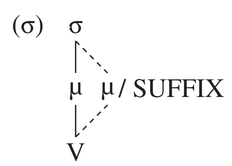
Output:
darasu 'he learnt it m.'





Output:
šāfak 'he saw you m.s.'

(13) *Pre-suffix lengthening (CA)*



Cairene pre-suffix lengthening is exemplified in the following examples:

(14)			
(14)	*/ma darastu + š/*	*ma darastūš*	'you pl. didn't learn'
	/ma šuftu + š/	*ma šuftūš*	'I didn't see it m.'
	/ᶜallimu + ni/	*ᶜallimūni*	'they taught me'
	/šufna + ha/	*šufnāha*	'we saw her'
	/ʔult + u + lak/	*ʔultūlak*	'I told you m.s. it m.'

In Cairene, when a consonant-initial object suffix, the negative suffix, or a preposition plus object suffix is concatenated to a morpheme ending in VCC, syllable structure is maintained through epenthesis, as in *ḥabb**i**na* 'he loved us', *yiḥibb**u**kum* 'he loves you pl.', *ma yḥibb**i**š* 'he doesn't love', and *ḥabb**a**ha*[6] 'he loved her' (Broselow 1976: 126–7; cf. Section 4.4.1.1). When the pre-suffixal element ends in VVC, the long vowel is subject to CSS to prevent a word-internal CVVC syllable (see Section 4.4.1.3, cf. Section 9.1.1).

(15)			
(15)	*/nisīt + ha/*	*nisitha*	'I/you m.s. forgot her'
	/ramēt + ha/	*ramitha*	'I/you m.s. threw it f.'
	/ramēt + laha/	*ramitlaha*	'I/you m.s. threw to her'

In San'ani, epenthesis occurs when a consonant-initial suffix or a prepositional phrase is concatenated to a morpheme ending in VCC, as in *ḥabb**a**nā* 'he loved us' and *absart**a**lahā* 'I saw for her' (see Section 4.4.1.1). When the pre-suffixal

[6] The epenthetic vowel is realized as [i] in non-harmonic environments and as [u] when the following morpheme contains an /u/ vowel (see Section 4.4.1.1). The [a] vowel in *ḥabb**a**ha* 'he loved her' is due to assimilation of [guttural] from the following guttural consonant and guttural vowel.

element ends VVC or ayC, CSS fails to take place, in contrast to Cairene, and epenthesis is optional (see Section 4.4.1.3): both *ḥabbaytukum* and *ḥabbaytkum* 'I loved you m.pl.', *jarraytalahā* and *jarraytlahā* 'I took for her' are attested. When the negative suffix is affixed to a perfect verb ending in a consonant plus *-t* of the {first person singular} or {second person masculine singular}, no epenthesis takes place, resulting in a three-consonant cluster (see Section 4.3); when the negative suffix *-š* is affixed to a verb ending in a geminate consonant, degemination occurs (see Section 8.1.6). The affixation of the negative suffix is exemplified in (16).

(16)	(a)	/*mā katabt + š*/	*mā katabtš*	'I/you m.s. didn't write'
		/*mā libist + š*/	*mā libistš*	'I/you m.s. didn't wear'
	(b)	/*mā ḥabb + š*/	*mā ḥabš*	'he didn't love'
		/*mā tijirr + š*/	*mā tijirš*	'she doesn't take'

7.1.3 *Allomorphy*

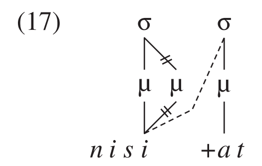
Level-two verbal morphemes display a limited amount of allomorphy in the dialects. In Section 7.1.3.1, I consider allomorphy in San'ani vowel-initial subject suffixes. In Section 7.1.3.2, I discuss allomorphy in the object suffixes.

7.1.3.1 *Allomorphy: San'ani subject suffixes*

The perfect aspect subject suffixes take the forms given in Table 7.1 when affixed to consonant-final verb stems, and consonant-initial suffixes are invariant irrespective of the prosodic structure of the verb stem. In San'ani, however, vowel-initial subject suffixes exhibit allomorphic variation which is dependent on whether the stem ends in a consonant or a vowel.

In the case of CiCii stems, the vowel-initial suffix is affixed directly to the stem. To adhere to the requirement that a syllable take an onset, glide formation takes place by which the vocalic matrix of the long vowel is dissociated from the rightmost mora and associates with the onset of the rightmost syllable (see Section 8.1.4). This is illustrated below in the derivation of *nisiyat* 'she forgot' (cf. *nisiyū* 'they m. forgot', *nisiyayn* 'they f. forgot').

(17)



In the case of affixation to stems ending in /ā/, the long stem vowel is deleted on affixation of a vowel-initial subject suffix, as in /*ramā* + *ayn*/ > *ramayn* 'they f. threw' (see Section 8.1.4). The other vowel-initial morphemes also have distinct allomorphs after vowel-final stems: {third person masculine plural} has the allomorph /aw/ and {third person feminine singular} the allomorph /it/, as in (18).

(18)	*ramaw*	'they m. threw'	*ramit*	'she threw'
	mallaw	'they m. filled'	*mallit*	'she filled'
cf.	*katabū*	'they m. wrote'	*katabat*	'she wrote'
	libisū	'they m. wore'	*libisat*	'she wore'

Historically, the /aw/ allomorph probably derives from historical coalescence of /a/ of the stem and /u/ of the {masculine plural} suffix, and the [dorsal] vowel in the {third person feminine singular} /it/ allomorph may reflect the quality of the lost glide of the verbal stem, **y*.

In the imperfect aspect, subject suffixes which take a long vowel—-*ū* {masculine plural} and -*ī* {second person feminine singular}—when affixed to a consonant-final stem take a diphthong allomorph—/aw/ and /ay/ respectively—when affixed to a vowel-final stem, irrespective of the quality of the final stem vowel. As in the perfect aspect, the final stem vowel is deleted on affixation of vowel-initial subject suffixes.

(19)	*yištaw*	'they m. want'	*tištay*	'you f.s. want'	(cf. *yištī* 'he wants')
	yirḍaw	'they m. agree'	*tirḍay*	'you f.s. agree'	(cf. *yirḍā* 'he agrees')
cf.	*yiktubū*	'they m. write'	*tiktubī*	'you f.s. write'	
	yilbasū	'they m. wear'	*tilbasī*	'you f.s. wear'	

7.1.3.2 *Allomorphy: object suffixes*

In Cairene and San'ani, vowel-initial object suffixes have a non-vowel-initial allomorph when affixed to a vowel-final stem. These are listed in Table 7.1 as post-V. Thus, while the object suffix {second person masculine singular} in San'ani is realized as /ak/ when suffixed to a consonant-final stem, as in *absart**ak*** 'I saw you m.s.', it is realized as /k/ when suffixed to a vowel-final stem, as in *ligī**k*** 'he found you m.s.'. In Cairene, the {second person feminine singular} object suffix is realized as /ik/ in post-consonantal position, as in *šuft**ik*** 'I saw you f.s.', but as /ki/ in post-vocalic position, as in *šafū**ki*** 'they saw you f.s.'.

The object suffixes {second person feminine singular} and {third person masculine singular} are subject to another type of allomorphy in Cairene to the left of the negative suffix. In post-consonant position, {second person feminine singular} has the allomorph /iki/ before the negative suffix, and the final vowel of the pronoun suffix is subject to pre-suffix vowel lengthening (see (13)), as in (20).

(20)	*šuftik*	'I saw you f.s.'	*ma šuftikīš*	'I didn't see you f.s.'

In post-vocalic position, the {third person masculine singular} object suffix takes the allomorph /hu/ before the negative suffix. As for {second person feminine singular}, the final vowel of the {third person masculine singular} object suffix is subject to pre-suffix lengthening. Consider the following examples.

(21)	*insā*(*h*)	'forget m.s. him!'	*ma tinsahūš*	'don't m.s. forget him!'
	insī(*h*)	'forget f.s. him!'	*ma tinsihūš*	'don't f.s. forget him!'
	insū(*h*)	'forget pl. him!'	*ma tinsuhūš*	'don't pl. forget him!'

7.2 LEVEL-TWO NOMINAL AND ADJECTIVAL MORPHOLOGY

The unmarked number for nouns and adjectives is singular,[7] and the unmarked gender masculine. Nouns are inflected for number (dual and plural) and, in certain lexemes, for gender (feminine). The nominal level-two morphemes are laid out in Table 7.2 and, as in Table 7.1, are numbered according to the order in which they are affixed to the stem.

In Cairene, a demonstrative or a prepositional phrase with a pronominal suffix may be cliticized to a preceding vowel-final noun in certain phrases and, in such cases, induce pre-suffix lengthening (cf. (13) in Section 8.1.1), as in: *bi-nisba* 'in relation' versus *bi-nisbāli* 'in relation to me' and *il-ḥāla* 'the situation' versus *il-ḥalādi* 'this situation' (Broselow 1976: 73).

7.2.1 *Affixation of level-two nominal morphemes*

In general, the nominal morphemes affix in the order given in Table 7.2 (however, cf. Section 7.2.3). Nominal morphemes in the level-two morphology affix minimally to the minimal phonological word, as is the case with verbal morphemes. The constraint on pre-suffixal short vowels is not restricted to the verbal morphology in Cairene, but also applies whenever suffixation takes place to a nominal morpheme ending in a short vowel. Consonant-initial possessive pronoun suffixes induce epenthesis when affixed to stems ending in VCC in both dialects. When a consonant-initial possessive suffix is affixed to a stem ending in VVC, the long vowel of the stem is subject to CSS in Cairene, as in: /*dīn* + *ha*/ > *dinha* 'her religion' and /*māl* + *kum*/ > *malkum* 'your pl. property'. In San'ani, the long vowel or diphthong of a stem ending in VVC or ayC or awC is maintained and suffixation takes place either with or without epenthesis, as in: /*māl* + *hum*/ > *mālhum* ~ *māluhum* 'their m. land', /*zawj* + *hā*/ > *zawjhā* ~ *zawjahā* 'her husband', and /*dayn* + *hin*/ > *daynhin* ~ *daynahin* 'their f. debt' (see Sections 4.4.1.3 and 7.1.2). Consider the example in (22) of the affixation of nominal level-two morphemes in Cairene.[8]

[7] Collectives/singulatives are an exception to this: for a number of nouns, a singulative is formed by adding a suffix *-a* or *-āya* in Cairene, *-ih* or *-ī* in San'ani, to a collective (see Sections 7.3.2, 7.2.4), for example, *mawz-ī* coll. *mawz* 'banana' (SA), *tuffāḥ-a* coll. *tuffāḥ* 'apple' (CA), *figl-a* ~ *figl-āya* coll. *figl* 'radish' (CA). When the collective is a verbal noun, the singulative or instance noun is formed exclusively by suffixation of *-a* in Cairene, *-ih* in San'ani.

[8] When a vowel-initial suffix is affixed to a noun or adjective ending in *-i* in Cairene, /i/ is subject to pre-suffix lengthening (see Section 8.1.1) and *y*-strengthening (see Section 8.1.2, Broselow 1976: 114). In San'ani, glide formation takes place before the vowel-initial suffix.

TABLE 7.2 Nominal morphemes

Order	Adjectival 1		Feminine 2		Adverb 3	Plural/dual suffixes 4		Possessive pronoun 5	
	SA	CA							
	-ī	*-i*							
			SA	CA					
			-ih	*-a*					
Construct			*-at-*	*-it-*					
					CA (SA)				
					-an				
Masculine						*-īn*			
Feminine						*-āt*			
Dual						*-ēn* (CA)	*-ayn* (SA)		
								SA/post-v	CA/post-v
1s								*-ī/-ya*	*-i/-ya*
2ms								*-ak/-k*	*-ak/-k*
2fs								*-iš/-š*	*-ik/-ki*
3ms								*-ih/-h*	*-u/-(h)*
3fs								*-hā*	*-ha*
1pl								*-nā*	*-na*
2mpl								*-kum*	*-ku ~ -kum*
2fpl								*-kin*	X
3mpl								*-hum*	*-hum*
3fpl								*-hin*	X

(22)			
(a)	Noun	*ʔarḍ*	'ground'
(b)	Noun + adjectival	*ʔarḍ + i*	'pertaining to the ground'
(c)	Noun + feminine/nom.	*ʔarḍiyy + a*	'floor, flooring'
(d)	Noun + plural	*ʔarḍiyy + āt*	'floors'
(e)	Noun + possessive	*ʔarḍiyyat + hum*	'their floors'

Now consider the example in (23) of affixation of nominal level-two morphemes in San'ani:

(23)			
(a)	Noun	*ᶜadan*	'Aden'
(b)	Noun + adjectival	*ᶜadan + ī*	'Adeni m.s.'
(c)	Noun + feminine	*ᶜadanīy + a*	'Adeni f.s.'
(d)	Noun + plural	*ᶜadanīy + āt*	'Adeni f.pl.'
(e)	Noun + possessive	*ᶜadanīyāt + hin*	'their f. Adenis f.pl.'

A good test of the productivity of morphemes is their ability to affix to non-native loan words. Cairene has a substantial number of loan words which have entered the language from different source languages at various stages in its history. Example (24) gives the affixation of nominal level-two morphemes to the recent loan word *ʔiliktrōn* ⟨Eng. 'electron'⟩ in Cairene.

(24)			
(a)	Noun	*ʔiliktrōn*	'electron'
(b)	Noun + adjectival	*ʔiliktrōn + i*	'electronic'
(c)	Noun + plural	*ʔiliktroniyy + āt*	'electronics'
(d)	Noun + possessive	*ʔiliktroniyyat + hum*	'their electronics'

7.2.2 *Allomorphy*

In both dialects, allomorphy is exhibited in the {feminine singular} nominal morpheme and in the {first person singular} possessive pronoun.

7.2.2.1 *Allomorphy: {feminine singular}*

The ending *-a* in Cairene, *-ih* in San'ani, which predominantly denotes {feminine singular} in nouns and adjectives (cf. n. 1) and as such is also used to derive nouns from relational adjectives (cf. (22) and (24)), has two allomorphs: /it/ (CA) and /at/ (SA) in the construct state and /a/ (CA) and /ih/ (SA) elsewhere. The second term in the genitive construct may be either a possessive pronoun suffix or a noun. The allomorphy characteristic of Arabic dialects today goes back to Classical Arabic where the morpheme was realized as [at] plus case ending in all but pre-pausal position. In pre-pausal position, it was realized as [ah] with no case ending. This positional allomorphy is denoted in the Arabic script by a complex symbol: the sign for /h/ together with the two superscript dots characteristic of /t/ (ö). The original-

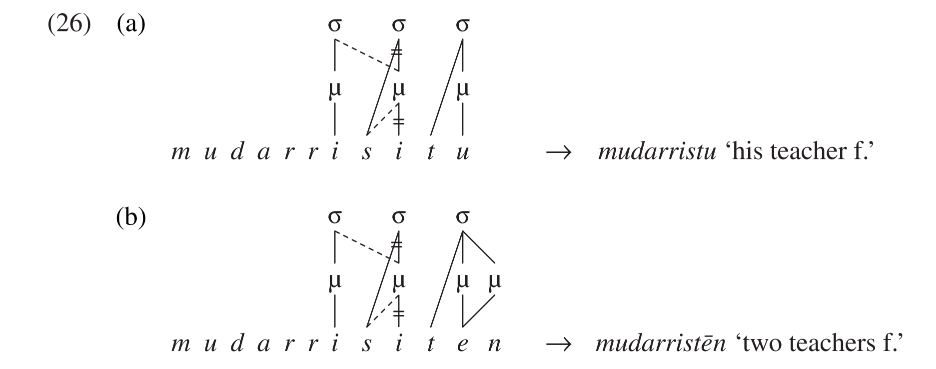
ly non-pausal *t allomorph is now restricted in almost all dialects of Arabic to the construct state.[9] Consider the following examples from San'ani and Cairene.

(25)	(a) San'ani	*marih*	'woman'
		marat aš-šayx	'the Shaykh's wife'
		maratih	'his wife'
	(b) Cairene	*mudarrisa*	'teacher f.'
		mudarrisit muna	'Muna's teacher f.'
		mudarrisitha	'her teacher f.'

The construct allomorph is also used before the dual ending, as in San'ani *yawmatayn* 'two days' and Cairene *šanṭitēn* 'two bags'.[10]

In Cairene, when a noun with the {feminine singular} suffix takes a following vowel-initial possessive pronoun suffix or the dual ending *-ēn* and is preceded by a monomoraic syllable, /i/ of the construct allomorph is subject to syncope (see Section 4.4.2).

(26)



7.2.2.2 *Allomorphy: {first person singular}*

The {second person singular} and {third person masculine singular} possessive pronoun suffixes are vowel-initial unless affixed to a vowel-final stem (see Table 7.2). This is similar to the allomorphy described above for the verbal object pronoun suffixes. Thus, 'your m.s. books' in Cairene and San'ani is *kutubak* with the possessive pronoun suffix realized as /ak/, while 'your m.s. father' is *abūk* with the possessive suffix realized as /k/. The San'ani {second person feminine singular} possessive suffix is realized as /iš/ post-consonantally, as in *kutub**iš*** 'your f.s. books', but as /š/ post-vocalically, to give *abū**š*** 'your f.s. father' and *gafā**š*** 'behind

[9] In northern Yemeni dialects spoken between Sa'dah and Razih, the /t/ allomorph is used in all definite nouns. The dialect of Farwah has forms such as *an-firsat* 'the axe', and the dialect of al-Gal'ah forms such as *ag-gaḥmat* 'the old man' (Behnstedt 1987: 54–5).

[10] For Cairene, Broselow claims that the dual is, at least historically, a construct phrase of noun plus the numeral *itnēn* 'two', and argues that this explains the realization of *-t-* before the dual suffix (Broselow 1976).

you f.s.'. In Cairene, the {second person feminine singular} possessive suffix is realized as /ik/ in post-consonantal position, but as /ki/ post-vocalically, as for the object suffix (see Section 7.1.3.2), to give *bin**tik*** 'your f.s. daughter' but *axū**ki*** 'your f.s. brother'.

A rather more interesting type of allomorphy is exhibited by the {first person singular} possessive pronoun suffix. This morpheme has two allomorphs in Cairene and three allomorphs in San'ani. In both dialects, the morpheme is realized as a vowel when suffixed to a consonant-final stem.

(27)

Cairene	*San'ani*	*Gloss*
ummi	*ummī*	'my mother'
ibni	*ibnī*	'my son'
kutubi	*kutubī*	'my books'

In Cairene, the morpheme has the allomorph /ya/ when suffixed to a vowel-final stem, and the pre-suffixal vowel is subject to lengthening.

(28)

Cairene	*Gloss*
abūya	'my father'
ḥamāya	'my father-in-law'
maᶜāya	'with me'
fīya	'in me'
līya	'to me'[11]

In San'ani, the /ya/ allomorph is attested when the morpheme is suffixed to a stem ending in *-ā*, but not when the stem ends in the *-i* of sub-minimal prepositions. In this latter case, the vowel of the stem is deleted and the /ī/ allomorph is used. Thus, while *gafā* + {first person singular} is realized as *gafāya* 'behind me' and *warā* + {first person singular} as *warāya* 'behind me', *li* + {first person singular} as *lī* 'to me' and *bi* + {first person singular} as *bī* 'with me'. The {first person singular} possessive suffix in San'ani has an additional lexicalized allomorph /nī/, presumably formed on analogy with the {first person singular} object suffix (see Table 7.1), which is only suffixed to the preposition *fī* 'in' to give *fīnī* 'in me'.

7.2.3 *The* -i *morpheme in Cairene*

The derivational morpheme *-i* in Cairene (*-ī* in San'ani) is typically suffixed to nouns to produce a relational adjective, as in *maṣri/ī* 'Egyptian' from *maṣr* 'Egypt' and *ġarbi/ī* 'west(ward)' from *ġarb* 'west'. In Cairene, the morpheme is also regularly suffixed to plural inanimate nouns to denote a professional or habitual noun (relating to humans) or a habitual adjective.[12] In this dialect, the *-i* suffix is a

[11] Negated, the form is realized as *ma līš*.

[12] San'ani has a few nouns and adjectives of the type plural + *-ī*, as in *banātī* 'girl's', *rijālī* 'men's', *ᶜiyyālī* 'children's'.

very productive means of forming professional or habitual nouns where either the *fa*^{cc}*āl* pattern commonly associated with professional nouns (as in *gazzār* 'butcher', *faṛṛān* 'baker') does not already exist, or where it cannot be formed. In a number of cases, a plural + *i* noun or adjective has a *fa*^{cc}*āl* synonym. Badawi and Hinds (1986) list over 140 instances of plural + *i* nouns or adjectives for Egyptian Arabic, the majority of which are attested in Cairene.[13] Whether the plural form to which the ending is affixed is a broken plural or sound feminine plural (that is, with the suffix *āt*) depends on the type of plural taken by the singular noun. Where the suffix is affixed to broken plurals, level-two morphology (the suffix) clearly follows level-one morphology (the derived broken plural). Where the suffix is affixed to a sound feminine plural, however, the ordering of level-two morphemes is reanalysed exceptionally, since the -*i* ending (ordered 1 in Table 7.2) now follows the {feminine plural} suffix (ordered 4 in Table 7.2). Consider the following examples of broken plural + -*i*.

(29)	*ʔugari*	'day labourer'	from *ʔugra* pl. *ʔugar*	'wage, pay'
	ʔuṣūli	'correct, proper'	from *ʔaṣl* pl. *ʔuṣūl*	'source'
	gurasi	'scandalmonger'	from *gursa* pl. *guras*	'scandal'
	ganayni	'gardener'	from *ginēna* pl. *ganāyin*	'garden'
	xiyami ~ *xiyāmi*	'tent-maker'	from *xēma* pl. *xiyam* ~ *xiyām*	'tent'
	marakbi	'boatman'	from *markab* pl. *marākib*	'boat'

Consider the examples in (30) of {feminine plural} + -*i*.[14]

(30)	*xirdawāti*	'haberdasher'	from *xirdawāt* /pl/	'haberdashery'
	zawāti	'aristocratic'	from *zawāt* /pl/	'upper class'
	sa^{c}*āti*	'watchmaker/ repairer'	from *sā*^{c}*a* pl. *sa*^{c}*āt*	'watch, clock'
	bibehāti	'babyish'	from *bibēh* pl. *bibehāt*	'baby'

Plural + -*i* nouns and adjectives are most commonly formed from the verbal participles of derived verbs, the vast majority of which are derived from form II verbs. In these cases, the plural is invariably formed by the {feminine plural} suffix.

(31)	*miʔawwilāti*	'twister, garbler'	from *ʔawwil*	'to deliberately misinterpret'
	mibakkašāti[15]	'bluffer'	from *bakkiš*	'to fool, bluff'
	mibayyaḍāti	'whitewasher'	from *bayyaḍ*	'to whiten'

[13] Two of the examples recorded are adverbs. These are *yomāti* 'daily' and *lelāti* 'nightly, every night'.

[14] M. Woidich considers these examples to involve a single suffix -*āti* (M. Woidich, p.c.). However, the existence of a large number of nouns formed from a broken plural plus -*i* suffix suggests that -*āt* + -*i* is a more morphologically economical analysis.

[15] This has a synonym formed on the *fa*^{cc}*āl* pattern, *bakkāš* 'bluffer'.

mibaṣbaṣāti	'flirt'	from *baṣbaṣ*	'to ogle'
mixabbarāti	'tell-tale'	from *xabbar*	'to tell, inform'
midaʔʔarāti	'frotteur'	from *daʔʔar*	'to rub one's body against someone for sexual satisfaction'
midahhabāti	'gilder'	from *dahhab*	'to gild'

In a very few cases, the plural portion of plural + *-i* nouns/adjectives is formed with the sound feminine plural even though the singular noun pluralizes by means of the broken plural. It may be that these examples, and the one in (33), can be analysed as involving a single suffix *-āti* (as suggested by M. Woidich, p.c.) on analogy with the {feminine plural} + *-i* formations given in (31).

(32) *maḥgarāti* 'quarry-man' from *maḥgar* pl. *maḥāgir* 'quarry'

A few nouns are attested in which the sound feminine plural is affixed to an apparent broken plural.

(33) *kurašāti* 'tripe-seller' from *kirša* sg. 'tripe'

7.2.4 *A homophonous morpheme in San'ani*

The suffixation of *-i* in the formation of professional or habitual nouns in Cairene has a clear link with the relational sense of the morpheme. Indeed, relational adjectives may function syntactically as nouns in the appropriate context. San'ani, however, has a morpheme which is homophonous with the relational morpheme, but which has a singulative and/or diminutive sense. The ending *-ī* is a feature of many singular nouns, several of which encompass the sense of smallness or refer to small entities.

(34)
ḏubbī 'fly'
zugzugī 'small alley'
kuskusī 'puppy'
xuzgī 'hole'
šijnī 'branch'
ᶜuḏmī 'bone'

A number of singular nouns are produced directly from a collective by suffixation of *-ī*.

(35)
ġurābī 'crow' (coll. *ġurāb*)
zurgayfī 'marble' (coll. *zurgayf*)
tawḥamī 'kernel' (coll. *tawḥam*)
gummalī 'flea' (coll. *gummal*)
nummasī 'mosquito' (coll. *nummas*)
gušmī 'large, white radish' (coll. *gušm*)

The diminutive in San'ani, attested in a few lexicalized items, is often marked by the suffixation of *-ī* in addition to templatic change.

(36) *šānanī* ‘draught’
zuġayrī ~ *zuġayyirī* ‘small’
zuġanninī ‘very small, tiny’
zuġandarī ‘very small, tiny’

Finally, -*ī* can function as a diminutive suffix on its own, particularly in the formation of pet-names for children. Typical pet-names for the names *ašwāg*, *ixlāṣ*, *īnās*, and *šahāb*, for example, are *ašwāgī*, *ixlāṣī*, *īnāsī*, and *šahābī.*

7.3 ADDITIONAL SUFFIXAL MORPHEMES IN CAIRENE

Cairene has a number of additional suffixal morphemes, some of which are due to Turkish influence and some of which are native. The suffixes due to Turkish influence are derivational and include -*gi*, -*li*, -*lik*, and -*xāna.* Of these, -*xāna* is originally Persian and came into Cairene via Turkish. Native suffixes include -*āni*, -*āwi*, -*awi*, and -*āya.* I first consider suffixes due to Turkish influence.

7.3.1 *Turkish suffixes*

The most common Turkish suffix in Cairene is -*gi*, which is used predominantly to produce a noun of profession or habitude. The plural of -*gi* nouns is formed by suffixation of the otherwise {feminine singular} morpheme (cf. n. 1) -*a* to give (via *y*-strengthening, see Section 8.1.2) -*giyya*. Between them, Badawi and Hinds (1986) and Prokosch (1983) record around 130 -*gi* nouns for Cairene, the vast majority of which are still part of the language. The suffix can be affixed to a verbal noun, a noun of place or instrument, a singular noun, a collective noun, a plural noun, or a verb. -*gi* is often suffixed to a singular loan word. In terms of the order of morphemes, -*gi* follows the output of level-one morphology (deverbal nouns, broken plurals); -*gi* suffixation applies to the word stem, overlooking the {feminine} morpheme -*a*, as exemplified in words such as *ʔidargi* ‘good administrator’ from *ʔidāra* ‘administration’, and *tazkargi* ‘ticket seller’ from *tazkara* ‘ticket’. In words such as *tuḥfagi* ‘dealer in art’ from *tuḥfa* ‘object of worth’ and *busṭagi* ‘postman’ from *busṭa* ‘post’, I analyse the pre-suffixal vowel as historically epenthetic as it is in words such as *naḥwagi* ‘given to speaking in elevated language’ (from *naḥw* + *gi*). The fact that the epenthetic vowel is not [i], as it is in the rest of the phonology, but [a], suggests that -*gi* words were initially produced at a stage in the history of the language when the epenthetic vowel was realized as [a]. Today the morpheme has two allomorphs: /agi/ following CC- and /gi/ elsewhere.[16] Consider the following examples.

[16] M. Woidich sees -*a*- in -*agi* not as epenthetic but as the result of Turkish words taken wholesale into Cairene and only later the two allomorphs -*gi* and -*agi* being incorporated into Cairene grammar (M. Woidich p.c.).

(37) -*gi* + verbal noun

ʔidargi	‘good administrator’	from *ʔidāra*	‘administration’
ta^{c}*limgi*	‘drill instructor’	from *ta*^{c}*līm*	‘teaching, instruction’
harabangi	‘shirker’	from *harabān*	‘fleeing’
taḥrirgi [obs.]	‘writer’	from *taḥrīr*	‘editing’

(38) -*gi* + noun of place/instrument

maxzangi	‘storekeeper’	from *maxzan*	‘store’
madfa^{c}*gi*	‘gunner’	from *madfa*^{c}	‘cannon’
maṭ^{c}*amgi*	‘restaurant owner’	from *maṭ*^{c}*am*	‘restaurant’
maktabgi [obs.]	‘book dealer’	from *maktaba*	‘library’
maklamangi	‘chatterbox’	from *maklama*	‘any place used for idle chatter’
makwagi	‘ironer [of clothes]’	from *makwa*	‘iron’

(39) -*gi* + singular noun

– loan singulars

ʔusturgi	‘French polisher’	from *ʔustur*	‘spirit polish’
ʔafyungi	‘opium addict’	from *ʔafyūn*	‘opium’
ʔawanṭagi	‘cheat, swindler’	from *ʔawanṭa*	‘trickery, deceit’
busṭagi	‘postman’	from *busṭa*	‘post’
tilliġrafgi	‘telegraphist’	from *tilliġrāf*	‘telegraph’

– native singulars

tuḥfagi	‘dealer in art’	from *tuḥfa*	‘object of worth’
ḥammamgi	‘bath attendant’	from *ḥammām*	‘public bath’
dawšagi	‘noisy person’	from *dawša*	‘loud noise, din’
tazkargi	‘ticket seller’	from *tazkara*	‘ticket’
sufragi	‘waiter’	from *sufra*	‘table’
ṣadafgi	‘worker in m-of-pearl’	from *ṣadaf*	‘pearl’

(40) -*gi* + plural (including collectives)

ʔuṣulgi	‘conformer’	from *ʔuṣūl*	‘roots, sources’
barawizgi	‘(picture) framer’	from *barawīz*	‘frames, edgings’
gawahirgi	‘jeweller’	from *gawāhir*	‘jewels’
sabarsagi	‘gatherer of butts’	from *sabāris*	‘cigarette butts gathered for re-use’
ʔumṣangi	‘shirtmaker’	from *ʔumṣān*	‘shirts’

(41) -*gi* + perfect verb

baṭaḥgi	‘bully, thug’	from *baṭaḥ*	‘to inflict a wound’
tamargi	‘nurse’	from *tammar*	‘to take care of’
ʔašargi	‘signalman’	from *ʔašār*	‘to signal, indicate’

(42) *-gi* + passive participle (very rare)
ma^{c}gungi [obs.] 'pharmacist' from *ma^{c}gūn* 'paste, electuary'

The suffixes *-lik* and *-xāna* are affixed to singular nouns to denote the place in which something is kept or made. Of the two suffixes, *-xāna* is the more common. Nouns ending in *-xāna* are pluralized by the {feminine plural} suffix *-āt*. Where the pre-suffixed noun ends in -CC, as in *sarg* 'saddle', syllable structure was preserved historically by epenthesis of *-a-*, as in the case of *-gi* nouns considered above.[17] Today the morpheme has two allomorphs: /axāna/ following a -CC base and /xāna/ elsewhere. Consider the following examples of noun + *-xāna*. I do not include nouns which have been borrowed in their entirety from Turkish.

(43) *ʔadabxāna* 'lavatory'
ḥaxamxāna 'chief rabbi's residence and administrative centre'
daftarxāna 'archive'
sargaxāna 'tackroom'
salaxāna 'slaughterhouse' (from *salx* 'skinning')
šafaxāna 'animal hospital'
ʔardaxāna 'noise, uproar' (probably from *ʔird* 'monkey')

Two non-obsolete examples of *-lik* nouns are listed in Badawi and Hinds (1986), and one in Prokosch (1983).

(44) *silaḥlik* 'armoury'
salamlik 'basement'
ḥaramlik 'women's quarters'

The suffix *-li* is restricted in occurrence. It is generally suffixed to place names to give an adjective with the sense 'pertaining from'. Badawi and Hinds (1986) also have a few examples of *-li* nouns or adjectives describing habitual characteristics or profession. Nouns ending in *-li* are pluralized by suffixation of *-a* via *y*-strengthening (see Section 8.1.2), as for *-gi*. Consider the examples in (45).

(45) *ʔaẓmirli* 'pertaining to Izmir'
buġdadli 'wooden piece half an inch by one inch (lath work)' (from *baġdād* 'Baghdad')
šarbatli 'vendor of sweet drinks' (from *šarbāt* 'fruit syrup')
wagbatli 'socially alert, never missing a chance to be courteous' (from */wāgib + āt/* 'obligations')

7.3.2 *Additional native suffixes*

The additional native suffixes in Cairene considered here are the adjectival suffixes *-āni*, *-āwi*, *-awi* and the singulative suffix *-āya*.

[17] M. Woidich analyses *-a-* in words such as *sargaxāna* as the result of a preferred vowel melody to which foreign nouns are modelled (M. Woidich p.c.).

The suffix *-āni* is often affixed to nouns ending in a vowel or in *-iyya* to produce an adjective. Suffixation of *-āni* to a vowel-final stem induces deletion of the stem-final vowel, as in *anāni* 'selfish' from *ana* 'I' and *barrāni* 'outer' from *barra* 'outside' (cf. Section 9.1.2.1). Suffixation applies directly to the stem and overlooks any suffixes in the noun. This is exemplified in *ʔiskandarāni* 'Alexandrian' from *ʔiskandariyya* 'Alexandria'. The suffix *-āni* derives a large number of adjectives from foreign place names, as in *ʔamrikāni* 'American' from *ʔamrīka* 'America' and *ṭalyāni* 'Italian' from *ʔiṭalya* 'Italy'. It also derives adjectives from adverbs, as in *barrāni* 'outer' from *barra* 'outside', *taḥtāni* 'lower, under' from *taḥt* 'underneath, below', *foʔāni* 'upper' from *fōʔ* 'up, upstairs', *warrāni* 'rear, back' from *wara* 'behind', and *guwwāni* 'inner' from *guwwa* 'inside'. In addition, *-āni* is used to derive adjectives which have a more specific or slightly different meaning from cognate adjectives. In this case, suffixation is to a consonant-final stem. Examples include *abyaḍāni* 'fair-complexioned (males only)' versus *abyaḍ* 'white', *asmarāni* 'dark-skinned, of dark complexion' versus *asmar* 'dark-skinned', *ašʔarāni* 'blondish' versus *ašʔar* 'blond', *aḥmarāni* 'reddish' versus *aḥmar* 'red', *ʔawwalāni* 'first, initial' versus *ʔawwil* 'first', and *ʔaxrāni* 'final, last adj.' versus *āxir* 'end, latter part'.

The suffix *-āwi* is also commonly affixed to nouns ending in a vowel or in *-iyya*. It is often used to provide an adjective with the sense of pertaining to a place. As for *-āni*, suffixation applies to the word stem overlooking any suffixes, and suffixation to a vowel-final stem induces deletion of the stem vowel. Consider the following words:

(46) *basṭāwi* 'pertaining to Tell Basta'
ṭanṭāwi 'pertaining to Tanta'
ġazzāwi 'pertaining to Gaza'
faransāwi 'French' (from *faransa*)
nimsāwi 'Austrian' (from *in-nimsa*)
ziftāwi 'pertaining to Zifta'
šarʔāwi 'pertaining to Sharqiyya'
ṣalḥāwi 'pertaining to es-Salihiyya'

In a few cases, an adjective ending in *-āwi* may be a (usually derogatory) near synonym of an adjective with the relational suffix *-i*.

(47) *ʔurubbāwi* 'aping European ways' (cf. *ʔurubbi* 'European')
ʔimbabāwi 'pertaining to Imbaba' (cf. *ʔimbābi*)
maṣrāwi 'Cairene' (with implication of sophistication, cf. *maṣri* 'Cairene')

-āwi can be used to derive adjectives from non-place nouns which end in a vowel.

(48) *dinyāwi* 'worldly' (from *dunya* 'world')
samāwi 'sky-blue' (from *sama* 'sky')
ṣaḥrāwi 'desert adj.' (from *ṣaḥra* 'desert')

xamsāwi	'five-fold' (from *xamsa* 'five')
ṣafrāwi	'rancorous' (from *ṣafra* 'bile')
ġalabāwi	'talkative' (from *ġalaba* 'idle chatter')

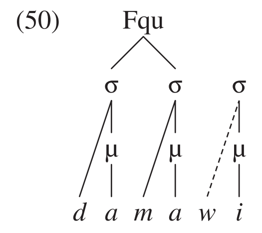
The suffix *-awi* is used regularly to derive adjectives from sub-minimal stems. The sub-minimal stems are usually augmented in their non-suffixed forms through gemination of the final radical. Consider the following examples:

(49)

damawi	'bloody' (from *dam*(*m*) 'blood')
axawi	'fraternal' (from *ax*(*x*) 'brother')
abawi	'paternal' (from *ab*(*b*) 'father')
yadawi	'by hand, hand adj.' (from *yad*(*d*) ~ *yad* 'hand')
sanawi	'annual' (from *sana* 'year')

These forms can be analysed as the Prosodic Morphology Hypothesis requiring a monomoraic extension prior to suffixation in order to provide the required pre-suffixal bimoraic base (cf. Sections 7.1.1 and 7.2.1). I therefore assume that the suffix comprises two elements—/a(w)/ and /i/. The initial portion is suffixed to the sub-minimal stem to provide a minimal bimoraic base for the adjectival suffix. The default consonant /w/ (see Section 6.6) then provides an onset for the adjectival suffix *-i*.

(50)



The unmarked number for nouns is singular, with the exception of collectives whose singulative or unit noun is derived by means of a suffix. In San'ani, the singulative suffix for concrete nouns is *-ī* for some nouns (see Section 7.2.4) and the {feminine singular} *-ih* for others. In Cairene, the suffix is usually the {feminine singular} *-a*, although a number of nouns have the singulative *-āya*. Nouns ending in *-āya* are pluralized by the {feminine plural} suffix. The *-āya* singulative is either synonymous with the *-a* singulative (51a), or it has a diminutive or slightly different sense to the *-a* singulative (51b). In some cases, *-āya* forms the singulative to the exclusion of *-a*.

(51)

(a)	*ḥabbāya*	'a seed, pimple, pin, bean' (= *ḥabba*)
	bazʔāya	'an onion sprout' (= *bazʔa*)
	figlāya	'a radish' (= *figla*)
	ᶜaggurāya	'a hairy cucumber melon' (= *ᶜaggūra*)
(b)	*dimmilāya*	'a pustule, sty' (cf. *dimmila* 'a pustule, pimple')
	gimmezāya	'a sycamore fig' (cf. *gimmēza* 'a sycamore, sycamore fig')

gamrāya 'a small piece of ember or live coal' (cf. *gamra* 'an ember, live coal')
dahabāya 'a small piece of gold' (no *dahaba*)

For collectives which themselves end in the feminine suffix -*a*, the singulative is formed by suffixation of -*āya* to the word, overlooking the feminine suffix.

(52) *firawlāya* 'a strawberry' (coll. *firawla*)
faḍḍāya 'a piece of silver' (coll. *faḍḍa*)
ᶜasaliyyāya 'a hard stick-shaped confectionery from molasses and sugar' (coll. *ᶜasaliyya*)

7.3.3 *Additional suffixal morphemes in San'ani*

San'ani has fewer additional suffixal morphemes than Cairene, in particular those due to foreign influence. This is largely due to the fact that the Turks had considerably less influence in Yemen than in Egypt. Although foreign morphemes have been adapted to the San'ani phonological system, they are rarely productive and are found predominantly in frozen forms or borrowings. Words involving -*jī* are mainly related to military or defence activity, and include the following (obsolete words marked [obs.]):

(53) *tfakjī* 'gunsmith' (from Turkish *tüfekᶜi*)
ṭubšī 'artillery man' (from Turkish *topçu*)
nūbatšī 'sentry, watchman' (from Turkish *nöbetçi*)
ōdajī [obs.] 'valet, servant' (from Turkish *odacı*)
ajzajī [obs.] 'pharmacist' (from /*ajzā* + *jī*/)
mafraġjī 'idler' (from /*mafraġ* + *jī*/)

The last two examples affix the Turkish suffix to an Arabic word, and the remainder are probably direct loans from Turkish. While -*gi* has become part of the morphology in Cairene, -*jī* was never fully adopted in San'ani, and words containing -*jī* have largely dropped out of the language. The majority of words with the Turkish suffix -*jī* listed in Rossi's glossary of 1939 are no longer in use. Nouns ending in -*jī* are pluralized by suffixation of the otherwise {feminine singular} morpheme -*ih* with pre-suffixal glide formation.

Other foreign suffixes are less common than -*jī*. One obsolete example of a word containing the suffix -*xānih* (= Cairene -*xāna*) in Rossi's glossary is *xastaxānih* or *astaxānih* 'hospital' (from Turkish *hastahane*). The suffix -*lak* is found in one word which is rarely used in the language today, *salāmlak* 'reception room'. The suffix -*lī* is found in one word which is now obsolete, *taᶜahhudlī* 'registered letter'.

7.3.4 *Additional native suffixes*

The principal additional native suffixes in San'ani are the mainly adjectival suffix-

es *-āni*, *-āwi*, and *-awī*. The singulative suffix *-āyih* (= Cairene *-āya*) is not attested in this dialect.

As in Cairene, *-āni* is generally suffixed to nouns ending in a vowel or the feminine suffix *-ih* to produce an adjective. On suffixation, the stem-final vowel is deleted and any feminine suffix is overlooked, as in *ṣanᶜānī* 'San'ani' from *ṣanᶜā* and *bayḏ̣ānī* 'from al-Bayda' from *al-bayḏ̣uh*. In a few cases, nouns are formed from a noun plus the *-ānī* ending; however, in the words concerned it may be that a noun-like sense has been imposed by the translator. These include *suxaymānī* 'fog, mist' from *suxām* 'soot' and *ᶜumāyānī* 'fog' from *ᶜumā* 'mist' (from the root /ᶜ-m-y/ indicating blindness).

The suffix *-āwi*, which is common in Cairene, is partially taken over in San'ani by the relational suffix *-ī* and does not have the alternative derogatory sense discussed for Cairene above. Thus, while in Cairene *faransa* is adjectivized by *-āwi* (*faransāwi*), in San'ani *faransā* may be adjectivized by either *-āwī* or *-ī*, to give *faransāwī* ~ *faransī* 'French' (Watson 1996: 30). Of these, *-ī* is considered to be more typically San'ani than *-āwī*. As in Cairene, *-awī* is suffixed to sub-minimal stems to produce an adjective, as in *abawī* 'paternal' from *ab* 'father', *samawī* 'sky-blue' from *samā* 'sky', and *damawī* 'blood-thirsty' from *dam* 'blood'.

7.4 CONCLUSION

In this chapter, I discussed level-two morphology in Cairene and San'ani. In contrast to level-one morphology, level-two morphology is entirely concatenative, and level-two processes invariably follow level-one processes. The level-two morphology is considered in terms of verbal and nominal morphology. Most level-two processes apply in a fixed order as given in the tables at the beginning of the relevant sections. In the level-two nominal morphology, however, we see that the suffix *-i*, normally used to derive relational adjectives from nouns, may be suffixed to broken or sound feminine plurals in Cairene to denote a professional or habitual noun. Where it is suffixed to a sound feminine plural, as in *saᶜāti* 'watchmaker/repairer' (from *saᶜāt* 'watches'), the ordering of level-two morphemes is reinterpreted, since the *-i* suffix, ranked as 1 in Table 7.2, now follows the feminine plural suffix, *-āt* which is ranked in Table 7.2 as 4. At the end of the chapter, I consider foreign and additional suffixes in the two dialects, and suggest that the metropolitan social history of Cairene is reflected in the elements, and in the semantics, of its richer nominal suffixal morphology.

8

LEXICAL PHONOLOGY

This chapter and the final two chapters of the book deal with general phonological processes. Phonological processes fall into two broad classes: those which are sensitive to lexical information and morphological structure, and those which do not exhibit such sensitivity. Processes which are insensitive to morphological structure take place after the elimination of all morphological cues. In a language such as English, with a mainly concatenative morphology, morphemic distinctions are encoded by means of labelled brackets which are removed at the end of each lexical cycle through Bracket Erasure:

(1) *The Bracket Erasure Convention*
Internal brackets are erased at the end of a level.[1]
(Kiparsky 1982: 140; Archangeli 1984*b*: 4; Kaisse and Shaw 1985: 9)

As seen in Chapter 6, in a mainly non-concatenative morphological system such as Arabic, morphemic distinctions are encoded both phonologically, through tier segregation, and morphologically, through the marking of morpheme nodes (μ). Towards the end of the derivation, morphemic tiers are folded together into a single linearized tier by a process known as Tier Conflation (see Section 6.3).

It has been assumed that with each application of TC, the relevant morphological information is erased, and that the effect of TC is similar to that of Bracket Erasure in languages which exhibit concatenative morphological systems (McCarthy 1986: 228). A morphologically conditioned rule of Metathesis in Modern Hebrew, however, demonstrates that TC does not necessarily erase all morphological information (Bat-El 1988): while some phonological processes apply prior to TC, others appear to apply after TC but still require access to morphological information. Two such processes in Arabic are the anticipatory assimilation of the *-l* of the definite article to a coronal (optionally also to a velar plosive in Cairene) and the assimilation of *t-* of the detransitivizing prefix to (a subset of) the coronals (and optionally a velar plosive in Cairene). Therefore the erasure of morpheme nodes, which eliminates the morphological cue to morphemic distinction, is equivalent to the Bracket Erasure Convention and not TC. Phonological processes which require access to morphological information apply either before or after TC but before the erasure of morpheme nodes. Where a phonological process does not

[1] Borowsky (1986) has claimed that Bracket Erasure applies at the end of the lexical levels, rather than at the end of each level. This, however, does not affect the argument which follows here, since TC occurs within the lexicon but does not erase all morphological information.

require access to morphological information, the process occurs after complete TC has taken place and morpheme nodes have been erased. Once morphological information has been erased, phonological processes may occur within specific prosodic units: the syllable, the foot, the phonological word, the phonological phrase, or the phonological utterance (cf. Nespor and Vogel 1986).

Processes which apply prior to the erasure of morphological information are equivalent to the rules of Lexical Phonology which apply within the lexicon: they have some link with the morphology; they may have lexical exceptions; they are structure preserving insofar as they do not introduce or refer to contrastive segments; and they only apply within words (McMahon 1994: 66). Processes which lack lexical exceptions, which are not subject to morphological conditioning, which introduce or refer to non-contrastive segments, which are exceptionless, and which apply across words as well as within them apply post-lexically (cf. Kaisse and Shaw 1985: 4–5; McMahon 1994: 66). In contrast to lexical processes, post-lexical processes often result in gradient rather than binary outputs: in the spread of pharyngealization (see Sections 10.3 and 10.4), emphasis decreases towards the end of the domain and may result in a segment which is pharyngealized at the edge close to the trigger, but non-pharyngealized at the edge away from the trigger. Post-lexical processes may also create novel sequences that are disallowed in the lexicon: in Chapter 4, we saw that the San'ani fast speech phenomenon deleting unstressed vowels in initial syllables produces unusual clusters of consonants, as in *ḥflih* 'party' < *ḥaflih* (see Section 4.4.2.3). The lexical process of degemination and syncope in form II verbs in the same dialect, by contrast, results in sequences which are permitted in the lexicon, as in: *yilabsū* 'they m. dress (someone)' < *yilabbisū* (see Section 4.4.2.2). Finally, speakers judge the outputs of lexical processes to be different from the inputs, but the output of postlexical processes to be the same as the inputs: for example, speakers typically judge all allophones of voiceless stops to be the same.

In this chapter I consider phonological processes which require access to morphological information. Chapters 9 and 10 deal with post-lexical phonological processes. In discussing phonological processes, I consider processes which affect the prosody and then processes which affect the melody.

8.1 PROSODIC PROCESSES

8.1.1 *Pre-suffix vowel lengthening (in CA)*

Suffixes do not affix directly to a morpheme with a final short vowel. Where a morpheme ends in a vowel in San'ani, the vowel is invariably long and hence bimoraic. In Cairene, however, there are a number of short-vowel-final morphemes. When a suffix is concatenated to a morpheme ending in a short vowel, the vowel of this morpheme is lengthened (see Section 7.1.2). Examples of pre-suffix vowel lengthening in Cairene are in (2).

(2)	*/fi + k/*	*fīk*	‘in you m.s.’
	/abu + ya/	*abūya*	‘my father’
	/ġaṭa + ha/	*ġaṭāha*	‘her cover’
	/(ma) kunti + š/	*(ma) kuntīš*	‘you f.s. were not’
	/ʔūlu + li/	*ʔulūli*	‘tell pl. me’

When a noun or adjective taking the {feminine singular} suffix *-a* is followed by a prepositional phrase with a pronoun suffix, the prepositional phrase is cliticized to the *a*-final word and pre-suffix vowel lengthening occurs:

(3)	*/gayba + lu/*	*gaybālu*	‘having brought f.s. to him’
	/maw^{c}*ūda + bak/*	*maw*^{c}*udābak*	‘promised f.s. to you m.s.’
	/bi-nisba + li/	*bi-nisbāli*	‘in relation to me’

Pre-suffix vowel lengthening takes place when the demonstrative pronoun *da* or *di* is cliticized to a vowel-final preposition or to a noun ending in *-a*, as in (4).

(4)	*/is-sana + di/*	*is-sanādi*	‘this year’
	/^{c}*ala + da/*	^{c}*alāda*	‘on that m.’

Pre-suffix vowel lengthening occurs even when the suffix is not realized phonetically, as in the post-vocalic allomorph of the {third person masculine singular} object suffix:

(5)	*/šāfu + (h)/*	*šafū(h)*	‘they saw him’
	/maska + (h)/	*maskā(h)*	‘holding f.s. him’

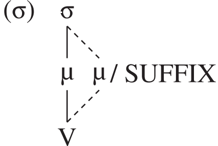
Pre-suffix vowel lengthening can be seen as resulting from a constraint on the weight of pre-suffixal bases. This is formalized as a negative constraint on morphemes ending in a monomoraic vowel pre-suffixally:

(6) *

σ
|
μ / SUFFIX

When a morpheme ending in a short vowel occurs in pre-suffixal position, violations of constraint (6) are repaired by lengthening of the pre-suffix vowel. Pre-suffix vowel lengthening is formalized as mora reduplication, repeated in (7) from Section 7.1.2.


(7) *Pre-suffix lengthening (CA)*



Pre-suffix lengthening is a cyclic rule. That is to say, it is a rule in which the derivation proceeds in stages through the repeated application of the same set of ordered rules to successively larger, more inclusive strings (Kenstowicz 1994: 203–4). Cyclic rules are subject to the Strict Cycle Condition in (8) (after Kenstowicz 1994: 208, adapted from Mascaró 1976 and Halle 1978), which restricts their application to derived environments only.

(8) *Strict Cycle Condition*

A cyclic rule may apply to a string x just in case either of the following holds:

(a) The rule makes crucial reference to information in the representation that spans the boundary between the current cycle and the preceding one.

(b) The rule applies solely within the domain of the previous cycle but crucially refers to information supplied by a rule operating on the current cycle.

Pre-suffix vowel lengthening feeds a further rule of unstressed long vowel reduction (see Section 9.1.1). Consider the derivation of *ma-šafuhūš* 'they didn't see him' (square brackets delineate morphemes).

(9)

First cycle	*šāfu*
Second cycle: morphology	[*šāfu*]*h*]
Phonology: pre-suffix VL	*ū*
Phonology: unstressed VS	*a*
	šafū(*h*)
Third cycle: morphology	*ma* [*šafūhu*]*š*]
Phonology: pre-suffix VL	*ū*
Phonology: unstressed VS	*u*
Output:	*ma-šafuhūš*

In (9), the vowel subject to lengthening falls within the domain of the previous cycle, but pre-suffix vowel lengthening refers crucially to information added by the current cycle—namely, the suffix. Pre-suffix vowel lengthening therefore conforms to (a) and (b) of the Strict Cycle Condition.

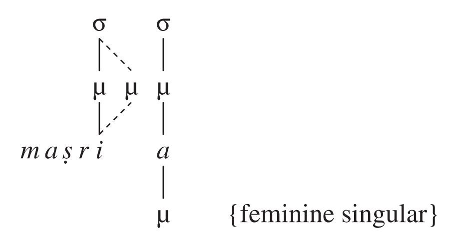
8.1.2 y-*strengthening (in CA)*

Pre-suffix lengthening in Cairene is most apparent when the suffix or clitic is consonant initial, as in the cases given in (2) and (3) above. Pre-suffix lengthening is not restricted to pre-consonantal position, however, and also occurs on concatenation of a vowel-initial suffix to a vowel-final morpheme (ending in -*i*).[2] In this case,

[2] The nominal {feminine singular} suffix -*a* constitutes an exception to this when it takes a pronominal suffix. Here, the constraint on short pre-suffixal vowels is met through allomorphy, with the morpheme taking the construct allomorph /it/ (see Section 7.2.2.1).

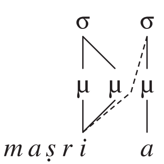
pre-suffix lengthening is followed by glide formation and *y*-strengthening (cf. Broselow 1976: 114–16). When an adjective or noun with the relational ending *-i*[3] or the ending *-gi* or *-li* (see Section 7.3.1) takes a vowel-initial suffix, *-i* is subject to pre-suffix lengthening through mora reduplication, as in (12a). (In this and the following diagrams, where both moras and morphemes are represented, μ above the segmental tier represents a mora, and μ below the segmental tier a morpheme.)

(10) (a) Pre-suffix vowel lengthening



After the conflation of morphemic tiers, mora reduplication leaves the vowel of the suffix without the required onset. In response to the requirements of syllable well-formedness, glide formation takes place through association of the leftmost vocalic matrix with the adjacent syllable node, and the glide becomes the onset of the rightmost syllable (cf. Sections 8.1.4 and 9.1.2.2).

(b) Glide formation



Output: *maṣrīya* 'Egyptian f.'

The processes of pre-suffix vowel lengthening and glide formation are apparently no different here from other cases of pre-suffix lengthening discussed above and glide formation discussed in Section 9.1.2.2. However, in contrast to other long vowels which result from pre-suffix lengthening, the resulting bimoraic vowel is resistant to unstressed long vowel shortening. This is exemplified in (11), in which *ī* does not fall in the rightmost heavy syllable.

(11)	*/maṣri + āt/*	*maṣrīyāt*	'Egyptians f.'
	/maṣri + īn/	*maṣrīyīn*	'Egyptians m.'
	/fanansāwi + āt/	*faransawīyāt*	'French f.pl.'

The examples in (11) compare with those in (12), in which an underlyingly bimoraic [dorsal] vowel is subject to unstressed vowel shortening.

[3] Also nouns ending in *-gi* and adjectives ending in *-li* (see Section 7.3.1).

(12) /*rīḥa + ha*/ *riḥitha* 'its f. smell'
/*ḥīla + hum*/ *ḥilithum* 'their trick'
/*yisīb + u + ni*/ *yisibūni* 'they leave me'

The lack of shortening of *ī* when an adjective or noun ending in -*i* is concatenated with a vowel-initial morpheme is no different from the lack of shortening of unstressed /iy/ which results from /iyi/ through syncope. This is exemplified in (13).

(13) /*bi + yisāfir*/ *biysāfir* 'he is travelling'
/*bi + yiṣūm*/ *biyṣūm* 'he is fasting'
/*bi + yiḥaḍḍar*/ *biyḥaḍḍar* 'he is preparing'

Scholars of Cairene Arabic generally distinguish high vowels which fail to undergo shortening from those which do by representing the former as vowel + glide and the latter as long vowels. Broselow (1976: 113) says that the sequence /i:y/ never occurs, but rather is always realized as [iyy].[4] Thus, *yamanīyāt* 'Yemenis f.' is represented as *yamaniyyāt*, while length in the long vowel in *fīl* 'elephant' is represented by a macron. This is a practice I follow in this work. The result of pre-suffix lengthening and glide formation is analysed not as a long vowel + glide sequence, but as a short vowel plus geminate /yy/. In order to capture this fact, I term the combined pre-suffix lengthening and glide formation process '*y*-strengthening'.[5]

8.1.3 n-*strengthening*

The gemination of /n/ in sub-minimal words is arguably another instance of pre-suffix mora reduplication (cf. Section 5.2.3). In both Cairene and San'ani, final /n/ in a monomoraic function word is geminated before a pronoun suffix. Gemination of final sonorants in monomoraic function words is a feature of several other modern dialects of Arabic, and also of Standard Arabic before a vowel-initial suffix. Examples from Cairene and San'ani include the following.

(14) /*min + hā*/ *minnahā* 'from her' (SA)
/*min + ha*/ *minnaha* 'from her' (CA)
/*min + ih*/ *minnih* 'from him' (SA)
/*min + u*/ *minnu* 'from him' (CA)
/*ᶜan + iš*/ *ᶜanniš* 'about you f.s.' (SA)
/*ᶜan + ik*/ *ᶜannik* 'about you f.s.' CA

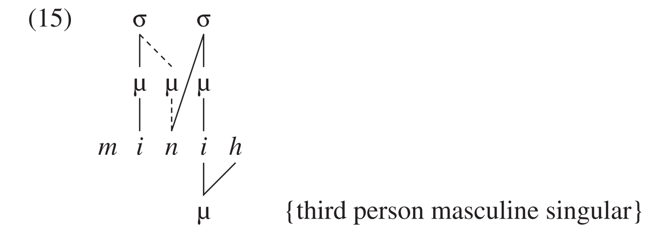
Gemination of /n/ in monomoraic function words is the result of a constraint on monomoraic stems in the dialects (see Section 6.4.2), and the requirement

[4] Likewise, the sequence /u:w/ is never realized as such, but rather as [uww]: *huwwa* 'he' is negated as *ma huwwāš* 'he is not'.

[5] Morphemes ending in -*ī* in San'ani are subject to glide formation when concatenated with a vowel-initial morpheme, but not subject to pre-suffix lengthening since the pre-suffixal vowel is already bimoraic.

that level-two morphemes are affixed to a form at least the size of the minimal phonological word (see Section 7.1). Before a suffix, pre-suffix mora reduplication applies to produce a minimal stem, and /n/ of the function word associates both with the new mora and with the onset of the following syllable. This is exemplified in (15) in the derivation of San'ani *minnih* 'from him'.

(15)



Following TC, gemination of /n/ produces the output *minnih* 'from him'. In fast, casual speech, gemination of /n/ may fail to apply before consonant-initial suffixes. Thus, the following alternative pronunciations may be heard:

(16) *minhā* ~ *minnahā* 'from her' (SA)
minnā ~ *minnanā* 'from us' (SA)
minha ~ *minnaha* 'from her' (CA)
minna ~ *minnina* 'from us' (CA)

The optional failure of *n*-gemination before a consonant-initial suffix is due to the fact that pre-consonantally, /n/ maintains the mora gained through mora reduplication, allowing the stem to fulfil the prosodic requirement of bimoraicity.[6]

8.1.4 **V–V resolution in the inflection of final-weak stems*

Pre-suffix vowel lengthening in Cairene occurs in all pre-suffixal environments except when a vowel-initial subject marker is suffixed to the perfect stem of a vowel-final (final-weak) verb, or a vowel-initial gender/number suffix to the stem of a vowel-final active participle. The suffixation of a vowel-initial morpheme to a vowel-final stem violates the requirement that syllables take an onset (see Sections 4.4.1.2 and 9.1.2.3):

(17) σ
• μ

Where a final-weak verb or active participle stem takes a vowel-initial suffix, the requirement in (17) is met through one of two complementary repair processes. When the verb stem ends in /a/ (/ā/ in San'ani), the leftmost vowel is deleted on suffixation (cf. Sections 6.5.6.1 and 7.1.3.1 for San'ani)—see (18).

[6] Cf. Farwaneh (1997) for a similar analysis of dative *l*-gemination in Saudi and Levantine dialects and interfix gemination in Omani.

(18) (a) Cairene

/rama + it/	*ramit*	'she threw'
/rama + u/	*ramu*	'they threw'

(b) San'ani

/ramā + it/	*ramit*	'she threw'
/ramā + aw/	*ramaw*	'they m. threw'
/ramā + ayn/	*ramayn*	'they f. threw'

When the verb stem ends in /i/ (/ī/ in San'ani), glide formation takes place to provide an onset for the unsyllabified vowel, as in the following examples:

(19) (a) Cairene

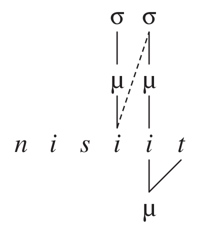
/nisi + it/	*nisyit*	'she forgot'
/nisi + u/	*nisyu*	'they forgot'
/māli + a/	*malya*	'full f.s.'
/māli + īn/	*malyīn*	'full m.pl.'

(b) San'ani

/nisī + at/	*nisiyat*	'she forgot'
/nisī + ū/	*nisiyū*	'they m. forgot'
/nisī + ayn/	*nisiyayn*	'they f. forgot'
/mālī + ih/	*māliyih*	'full f.s.'
/mālī + īn/	*māliyīn*	'full m.pl.'

In Cairene, glide formation takes place through association of the leftmost vocalic matrix with the adjacent syllable node, as in (10b) above.

(20) *Cairene*



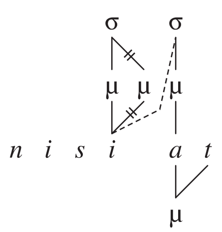
{third person feminine singular}

The output of glide formation, **nisiyit*, is subject to syncope (see Section 4.4.2.1) to give the realization *nisyit* 'she forgot'.

In San'ani, glide formation is accompanied by delinking of the rightmost mora of the stem template, as in (21).

Deletion of /a/ (/ā/ in San'ani) prevocalically is attested in other areas of the phonology to resolve the constraint on onsetless syllables (see Section 9.1.2.1). However, in neither dialect is it attested elsewhere in the lexicon: when an *a*-final morpheme is concatenated with the {first person singular} possessive suffix, which is vowel-initial post-consonantally, the suffix takes the glide-initial allomorph, /ya/ (see Section 7.2.2.2). Thus, while *umm* + {first person singular} is realized as

(21) San'ani



{third person feminine singular}

ummī 'my mother' in San'ani and *ummi* in Cairene, San'ani *ḥamā* + {first person singular} is realized as *ḥamāya* 'my husband's brother', *gafā* + {first person singular} as *gafāya* 'behind me' and *warā* + {first person singular} as *warāya* 'behind me'. In Cairene, an *a*-final morpheme is subject to pre-suffix lengthening before the glide, to give, for example, /*ḥama* + *ya*/ > *ḥamāya* 'my father-in-law' and /*ma*^{c}*a* + *ya*/ > *ma*^{c}*āya* 'with me'.

The glide formation characteristic of final-weak verb stems ending in /i/ is also attested in other areas of the phonology to resolve the constraint on onsetless syllables (see Sections 8.1.2 and 9.1.2.2). However, in the lexical component, this process only occurs without *y*-strengthening in Cairene when a vowel-initial inflectional suffix is affixed to the verb stem or active participle of a final-weak root. In all other cases, including the inflection of non-participial final-weak adjectives, the vowel of the pre-suffixal morpheme is subject to *y*-strengthening. The examples in (19a) compare with those in (22).

(22)	/*zaki* + *a*/	*zakiyya*	'clever f.s.'
	/*māl* + *i* + *a*/	*maliyya*	'financial f.s.'
	/*māl* + *i* + *īn*/	*maliyyīn*	'financiers m.'
	/*makwa*+*gi* + *a*/	*makwagiyya*	'people whose trade is ironing clothes'

8.1.5 *Diphthong reduction and* n-*strengthening (in SA)*

In Chapter 4 we saw that the diphthong of the {feminine plural} subject suffix -*ayn* is reduced to -*a*- before the negative suffix -*š*, and in fast speech the diphthong of function words and linking verbs may be reduced and the function word or linking verb procliticized (see Section 4.4.1.3). The maintenance of diphthongs in identical phonological environments where other lexical items are involved, as in *bayn ṣan*^{c}*ā wa-ta*^{c}*izz* 'between San'a and Ta'izz', indicates that Closed Diphthong Shortening is a lexical process which is motivated partly by syllable requirements.

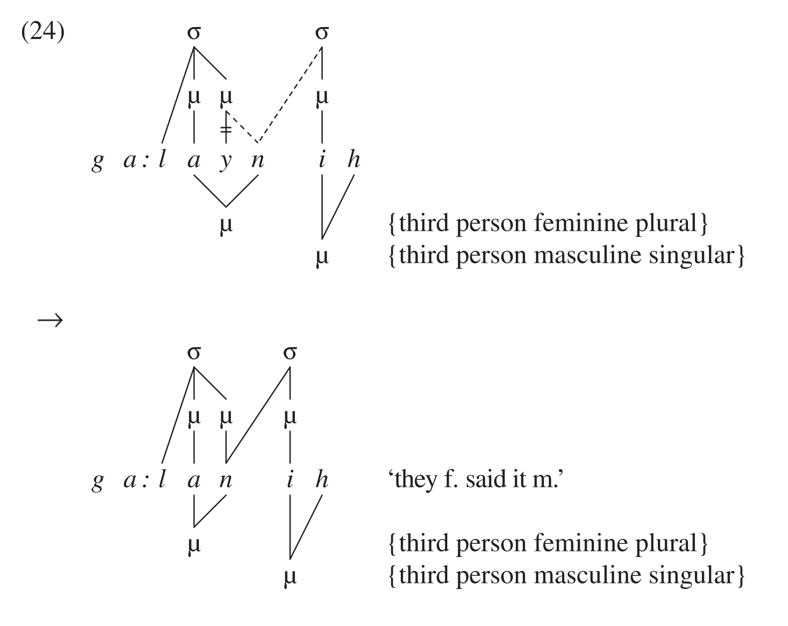
Closed Diphthong Shortening also occurs when the {feminine plural} subject suffix takes an object suffix, but in this case it is accompanied by compensatory *n*-strengthening (cf. Section 8.1.3; Watson 1996: 102–3). Examples of diphthong reduction and *n*-strengthening include the following:

(23)	*/ʔabsarayn + hā/*	*ʔabsarannahā*	‘they f. saw her’
	/ʔabsarayn + iš/	*ʔabsaranniš*	‘they f. saw you f.s.’
	/ʔabsartayn + hum/	*ʔabsartannahum*	‘you f.pl. saw them m.’
	/ʔabsartayn + ih/	*ʔabsartannih*	‘you f.pl. saw him’

In contrast to Closed Diphthong Shortening, diphthong reduction and *n*-strengthening is not motivated by the requirements of the syllable—syllabically there is no reason for a sequence *-aynih* to be ruled out in favour of *-annih*: the sequence *-aynih* is attested in examples such as *baynih* ‘in it m.’ and *daynih* ‘his debt’. In the perfect of final-weak and doubled verbs, there is a (near-minimal) contrast between {third person feminine plural} and {first person plural} when a consonant-initial object suffix is suffixed: the diphthong is maintained in the case of {first person plural}, but not in the case of {third person feminine plural}. Thus, *bazzaynāhā* ~ *bazzaynahā* ‘we take her’ contrasts with *bazzannahā* ‘they f. take her’, and *ištaraynāhin* ‘we bought them f.’ with *ištarannahin* ‘they f. bought them f.’.

Diphthong reduction and *n*-strengthening in pre-suffixal position is represented as delinking of the second element of the diphthong. Diphthong reduction is followed by association of /n/ with the freed-up mora:

(24)



Following the erasure of morphological information, diphthong reduction and *n*-strengthening produces the output *gālannih* ‘they f. said it m.’.

In fast, casual speech, *n*-strengthening may fail to take place before consonant-initial object pronouns (as in the case of monomoraic prepositions—see Section 8.1.3). The following alternative forms are heard:

(25) *ʔabsaranhā* ~ *ʔabsarannahā* 'they f. saw her'
ʔabsartanhum ~ *ʔabsartannuhum* 'you f.pl. saw them m.'
ʔabsarankum ~ *ʔabsarannukum* 'they f. saw you m.pl.'
ʔabsarannā ~ *ʔabsarannanā* 'they f. saw us'

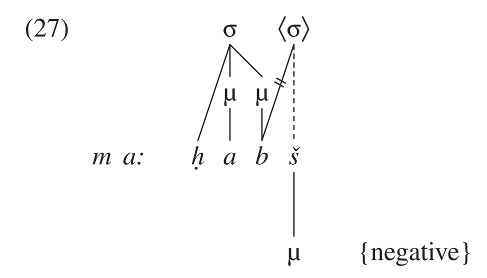
8.1.6 *Pre-{negative} degemination (in SA)*

In San'ani, final geminate consonants in verbs and pronouns degeminate before the negative suffix -*š* (see Section 4.3). This is in contrast to Cairene where suffixation of -*š* induces epenthesis. Compare the examples in (26).

(26)	*CA*	*SA*	*Gloss*
	ma ḥabbiš	*mā ḥabš*	'he didn't like/love'
	ma yḥissiš	*mā yiḥisš*	'he doesn't feel'
		mā ḥadš	'no one'

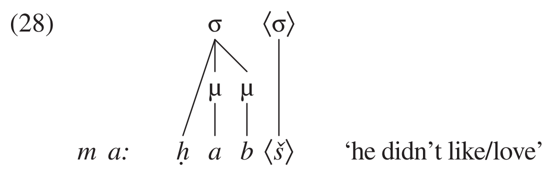
Domain-final syllables can be no larger than CVCC, with the final C licensed as extrasyllabic (see Sections 4.3 and 5.2.5).[7] Once suffixation of -*š* takes place, the right-leg of the geminate can no longer be licensed as extrasyllabic: /b/ is delinked from the extrasyllabic syllable node, and /š/ of the suffix associates directly with this syllable node in its stead:

(27)



Following TC and the erasure of morphemic nodes, pre-negative -*š* degemination produces the realization *mā ḥabš*, represented in (28).

(28)



Pre-*š* epenthesis in Cairene is a purely syllable-driven process, since any sequence of three consonants will be broken up by epenthesis (see Section 4.4.1.1), and therefore constitutes a post-lexical process. By contrast, although the process is invoked in response to a constraint on the weight of the rhyme, pre-*š* degemination in San'ani qualifies as a lexical process, since degemination occurs only before the negative

[7] With the exception of syllables ending in C*tš* (see Section 4.3).

suffix—when a morpheme ending in a geminate is concatenated with any other consonant-initial morpheme, structure is preserved by means of epenthesis, as in: *yiḥibb**u**kum* 'he likes you m.pl.', *ḥubb**a**nā* 'our love', and *kull**a**mā* 'whenever'.

8.1.7 h-*disassociation (in SA)*

/h/ has a limited distribution in Arabic. While it does form the initial consonant in a small number of relatively rare San'ani content words—including *hawir* 'greedy', *habb–yihibb* 'to jump up', *harab–yuhrub* 'to flee', and *hayl* 'cardamon'—it is most frequently attested as the initial consonant of the set of pronouns, including personal pronouns, demonstratives, locatives, and presentational particles. In a glossary of San'ani Arabic comprising 4,795 headwords and based on several hours of recorded monologues and dialogues, only 79 words are listed with initial /h/, of which 18 belong to the set of pronouns.

In a number of modern dialects, /h/ of the {third person} dependent pronouns is not realized post-consonantally. This is exemplified in Central Sudanese *bi-yaḍruba* 'he hits her' versus *nādāha* 'he calls her' (Persson and Persson 1979: 165). In the Libyan dialect of Siirt, the original initial **h* of the independent pronouns is not realized in any phonological environment; thus, 'he' and 'she' are realized as *ūwe* and *īye* (Fischer and Jastrow 1980: 53). In San'ani, in common with a number of other Yemeni dialects (Watson 1989: 140–1), /h/ of the {third person} independent pronoun is not realized when the pronoun is cliticized to the particles *gad* [copula], *ᶜād* 'still, yet (in negative)' or *miš* 'not'. Examples include those in (29).

(29)	*/gad + hū/*	*gadū*	'he is'
	/gad + hī/	*gadī*	'she is'
	/ᶜād + hum/	*ᶜādum*	'they m. are still'
	/ᶜād + hin/	*ᶜādin*	'they f. are still'
	/miš + hī/	*mišī*	'not she'
	/miš + hum/	*mišum*	'not them m.'

Deletion of /h/ also occurs when a {third person singular} pronoun is cliticized to the question words *man* 'who', *kayf* 'how', *kam* 'how many, much', or *ayn* 'where', or to the particle *inn* 'that'; /h/ of a {third person plural} pronoun is only deleted after *ayn* and *inn* in fast, casual speech—see (30).

(30)	*/man + hum/*	*manum*	'who are they m.?'
	/kam + hin/	*kamin*	'how many are they f.?'
	/kayf + hū/	*kayfū*	'how is he?'
	/ayn + hī/	*aynī*	'where is she?'
	/ayn + hum/	*aynuhum ~ aynum*	'where are they m.?'
	/ayn + hin/	*aynahin ~ aynin*	'where are they f.?'
	/inn + hū/	*innū*	'that he'
	/inn + hī/	*innī*	'that she'

/inn + hum/ *innuhum ~ innum* 'that they m.'
/inn + hin/ *innahin ~ innin* 'that they f.'

h-deletion does not occur when the {third person plural} pronoun is an object or possessive suffix, however, even though the object/possessive suffix is homophonous with the independent pronoun. Consider the following examples:

(31) */labbas + hum/* *labbashum* 'he dressed them m.'
/labbast + hin/ *labbastahin* 'I/you m.s. dressed them f.'
/bayt + hum/ *baythum ~ baytuhum* 'their m. house'
/malābis + hum/ *malābishum* 'their m. clothes'
/min + hin/ *minnahin ~ minhin* 'from them f.'

h-deletion also fails to occur in the dialect when /h/ is the initial consonant of a morpheme other than a {third person} pronoun, as in the following examples:

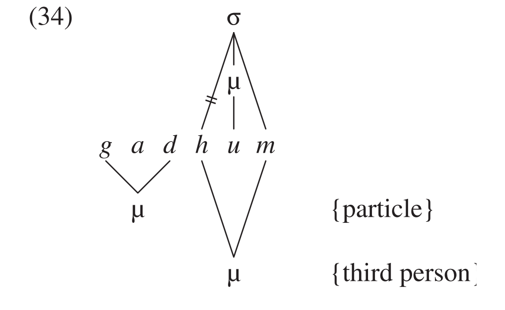
(32) */ᶜād + hilāl/* *ᶜād hilāl* 'the crescent of . . . is still'
/inn + hānā/ *inn hānā* 'that here'
/inn + hānāk/ *inn hānāk* 'that there'
/man + hāḏā/ *man hāḏā* 'who is that m.?'
/man + hāḏawlā/ *man hāḏawlā* 'who are they?'

In the Yemeni dialect of Hubaish, and a number of other dialects spoken in the Yemeni western mountain range, by contrast, pronoun *h*-deletion has extended to include /h/ of the demonstratives and locatives and occurs both post-consonantally and post-vocalically (Watson 1989: 138):

(33) */min + hūna/* *minūna* 'from here'
/bi- + hūna/ *būna* 'in here'
/man + hāḏā/ *manāḏā* 'who is that m.?'
/man + hāḏī/ *manāḏī* 'who is that f.?'

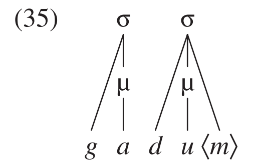
The fact that *h*-deletion only occurs when the aspirate is the first consonant of the {third person} pronoun and only after a small subset of particles indicates that this is a lexical process which requires specific morphological information. Deletion of /h/ of {third person} pronouns is represented as delinking /h/ from the syllable node to the right of specific morphemes.

(34)



Following TC and the erasure of morphological information, /*gad* + *hum*/ is realized as [*gadum*] 'they m. are' with the rightmost consonant of the particle syllabified as the onset of the rightmost syllable:

(35)



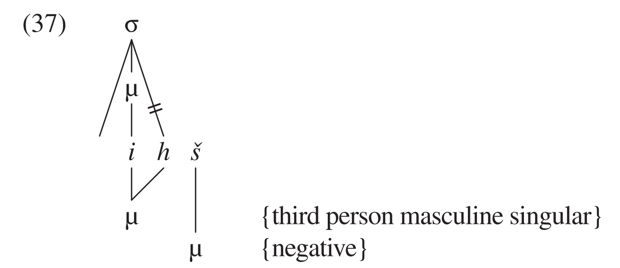
8.1.7.1 *Morpheme-final* h-*disassociation*

The weakness of pronominal /h/ is also seen in the behaviour of morpheme-final /h/ in the {third person masculine singular} object suffix and the homophonous nominal {feminine singular} suffix, -*ih*. In phonological-word-final position, /h/ of the object suffix is realized irrespective of whether the following word is vowel-initial or consonant-initial. 'I saw him in the house' is realized as *ʔabsarti***h** *fi l-bayt* and 'I saw him today' as *ʔabsarti***h** *al-yawm*. Similarly, /h/ is realized when the morpheme falls in utterance-final position, as in *ʔabsarti***h** 'I saw him'. Before the negative suffix -*š*, however, /h/ is deleted. In the examples in (36), the positive form is given in the left-hand column and the negated form in the centre column.

(36)	*labbastih*	*mā labbastiš*	'I/you m.s. did/didn't dress him'
	girītih	*mā girītiš*	'I/you m.s. did/didn't learn it'
	gultalih	*mā gultališ*	'I/you m.s. did/didn't tell him'

In contrast to the examples in (36), stem-final /h/ in verbs is not subject to deletion before the negative suffix: *yintabih* 'he pays attention' is negated as *mā yintabihš* and *yūbih* 'he looks after' as *mā yūbihš*. This indicates that *h*-deletion in this case is a lexical process which requires the morphological information {third person masculine singular}. Deletion of /h/ of the {third person masculine singular} object suffix is represented as delinking /h/ from the syllable node to the left of the negative suffix.

(37)



Following TC and the erasure of morphological information, -*š* of the negative suffix is syllabified within the preceding syllable.

/h/ of the nominal {feminine singular} suffix only ever occurs in phonological word-final position. The aspirate of this morpheme is phonologically weaker than

that of the {third person masculine singular} object suffix, and is realized only when a word with an initial consonant follows, or in phonological phrase-final position. Before the definite article or a vowel-initial word, /h/ is subject to deletion in all but the most careful of speech. The resulting V–V sequence is then resolved by vowel deletion (see Section 9.1.2.1). Compare the following examples:

(38)	*madrasih kabīrih*	vs.	*al-madrasi l-kabīrih*	'a/the big school'
	marih magṭūbuh	vs.	*al-mari l-magṭūbuh*	'a/the diligent woman'
	ṯalāṯih ᶜiyyāl	vs.	*ṯalāṯi yyām*	'3 children/3 days'

This can be summarized as a negative constraint on the realization of /h/ of the {feminine singular} suffix in intervocalic position. Voiceless consonants often weaken intervocalically in San'ani (see Section 9.2.7). Intervocalic lenition of /h/ results in voicing and reduction of frication. Only in the case of /h/ of the nominal {feminine singular} suffix does lenition result in total deletion of the laryngeal fricative. The forms in the right-hand column in (38) contrast with the following forms in which an albeit lenited /h/ does surface intervocalically: *absarti**h** al-yawm* 'I saw him today' (see above), *mušāba**h**ah* 'similarity', *nā**h**ī* 'okay, good', and *yintabi**h**ū* 'they m. pay attention'. Thus, deletion of intervocalic /h/ requires the information {feminine singular}. In the majority of modern Arabic dialects, including Cairene, /h/ no longer constitutes part of the nominal {feminine singular} morpheme. In these dialects, it is probable that deletion of /h/ of the {feminine singular} morpheme intervocalically became generalized to all syllabic positions until the phonological representation of the morpheme was reanalysed as a simple vowel, /a/ in some dialects, and /i/ in others.

8.2 MELODIC PROCESSES

The lexical melodic processes considered in this chapter involve total assimilation of adjacents. This contrasts with the majority of post-lexical melodic processes examined in Chapters 9 and 10, which involve the undergoer assimilating a portion of the matrix of the trigger. I assume, along the lines of Mohanan (1993), that an assimilatory situation is one in which two units have conflicting specifications with the specification of the one overriding that of the other (Mohanan 1993: 89). In an assimilation process /tk/ > [kk], for instance, the place feature [dorsal] overrides the feature [coronal]. When the specification of X overrides the specification of Y, X is said to be the *trigger* and Y the *undergoer* (Mohanan 1993: 89).

Assimilation tends to adhere to the notion of dominance. Where X overrides Y, X can be said to be dominant with respect to Y. Dominance is manifest in a number of areas: certain phonological features are more dominant than others: [sonorant] is a weak feature, for example, and the target of assimilation is usually the more sonorous consonant. Conversely, the trigger is the less sonorant consonant, and sonorants rarely trigger assimilation: in San'ani and Cairene nasal place assimilation, /n/ will acquire the place features of a following obstruent within the phono-

logical word, but rarely the place features of a following palatal or labio-velar glide: San'ani *yinba*^{c} is realized as *yi*[*m*]*ba*^{c} 'he jumps', but *yinwī* 'he intends' is usually realized as *yi*[*n*]*wī*. Place features are also not of equal strength; oral consonants are dominant with regard to non-oral consonants, and in a series of stops /k, p, t/, the velar /k/ tends to be more dominant than labial /p/ and dental–alveolar /t/, and labial /p/ to be more dominant than dental–alveolar /t/. This indicates that the place feature distinguishing /t/ is weaker than the feature distinguishing /p/, which in turn is weaker than the feature distinguishing /k/. When an assimilatory process involving /k/ and /t/ takes place, it is therefore more likely that /t/ will assimilate in place to /k/ than that /k/ will assimilate in place to /t/. Examples of this can be adduced from fast speech phenomena in English, where 'hot cakes' is realized as [hɒkkeyks] and 'hot potatoes' as [hɒppəteytowz] (Mohanan 1993: 71), but 'sick toads' is not realized as *[sittowdz].

Dominance is also linked to the relative position of trigger and undergoer. The undergoer of assimilation is more likely to be in the syllable coda than in the syllable onset, and the undergoer of assimilation is likely to be the preceding element. Conversely, the trigger is likely to be in the syllable onset and to follow the undergoer: in nasal place assimilation /n/ assimilates in place to a following obstruent, but not to a preceding obstruent. Thus, San'ani *tanfīs* is realized as *ta*[*ɱ*]*fīs* 'passing wind', but *afnān* 'mental or sensual activities' is realized as *af*[*n*]*ān*.

The smaller the domain, the more likely it is that an assimilation process will take place. Mohanan expresses this observation in two complementary statements, 'The force of attraction is stronger in a smaller domain than in a larger domain' (Mohanan 1993: 93) and 'A sequence that undergoes place assimilation in a larger domain will also undergo place assimilation in a smaller domain' (Mohanan 1993: 96). Again taking examples from nasal place assimilation, /n/ always assimilates in place to a following consonant within the phonological word, but in careful speech may not assimilate across a word boundary; this is exemplified in San'ani *minayn bašīr* 'from where is Bashir?' or *minaym bašīr*, *gadin misāfirāt* 'they f. are travelling' or *gadim misāfirāt*.

Mohanan's observations can be summed up as in (39).

(39) *Dominance in assimilation*

1. Certain features are more dominant than others: [−son] is dominant in relation to [+son]; in consonants, [dorsal] is dominant in relation to [labial] which is dominant in relation to [coronal].
2. The onset is dominant (with respect to the coda).
3. The following element is dominant (with respect to the preceding element).
4. The force of attraction is stronger in a smaller prosodic domain than in a larger domain.
5. The strength of assimilation is
   (a) directly proportional to the dominance of the trigger, and
   (b) inversely proportional to the dominance of the undergoer.

Finally, lexical assimilatory processes involve total assimilation, whereas post-lexical processes are likely to involve partial assimilation and may be gradient. In this way, lexical processes are structure preserving insofar as total assimilation will never result in a segment which is not part of the underlying inventory of the language, whereas post-lexical processes may not be structure preserving. This distinction can be appreciated by considering lexical and post-lexical processes which involve the same underlying consonants. When *-l* of the definite article assimilates to a following palatoalveolar, it assimilates all the root, stricture, laryngeal, and place features of the following palatoalveolar. Thus, *il-šams* 'the sun' in Cairene is realized as [*iš-šams*]. When /l/ assimilates to a following palatoalveolar postlexically, however, the lateral assimilates the place features of the trigger segment, but not the laryngeal or manner features: /l/ in *ma-daxalš* 'he didn't go in' in Cairene is realized as a voiceless palatoalveolar lateral, a sound which does not form part of the lexical inventory of the language.

8.2.1 *The role of the Obligatory Contour Principle*

Many cases of assimilation within both the lexical and the post-lexical components take place in response to a violation of the Obligatory Contour Principle (see Section 6.3) on a particular autosegmental tier within a particular morphological or phonological domain. Yip (1988) and van der Hulst (1988) reached the conclusion that the OCP could apply, not only to identical root nodes, but also to various autosegmental tiers below the root node. The principle behind this assumption is formalized by van der Hulst (1988: 99) as (40).

(40) The OCP ignores differences in dependent information.

Principle (40) is parametrized such that 'languages choose the hierarchical level at which it is relevant' (van der Hulst 1988: 102). If a language bans adjacent gutturals absolutely, [G] [G] will be avoided irrespective of any other feature information in the adjacent matrices. The scope or domain of the OCP can be limited, however, by statements which restrict its applicability to a particular tier in a particular context (McCarthy 1994: 206). The applicability of the OCP on the [coronal] tier, for example, may be restricted to adjacents which share the feature [sonorant]. The assimilation processes examined in this chapter take place in response to a violation of the OCP on the [coronal] tier within a particular morphological domain. In Chapter 9, we will see examples of post-lexical assimilation processes which occur in response to violations of the OCP on the [coronal], [guttural], and [dorsal] tiers. Of these, violations of the OCP on the [guttural] tier ignore all feature information other than [guttural], whereas the domain of the OCP on the [coronal] and [dorsal] tiers is restricted to particular contexts.

8.2.2 *Assimilation of* -l *of the definite article*

In all known Arabic dialects for which the definite article is either /al/ or /il/, *-l*

of the article assimilates totally to the following coronal consonant of the defined word (cf. Erwin 1963: 92 for Iraqi; Grand'henry 1976: 14 for Central Algerian; Haddad and Kenstowicz 1980 for Lebanese; Hamid 1984: 106 for Central Sudanese; Abumdas 1985: 137–8 for Eastern Libyan; Shahin 2000: 18 for Abu Shusha Palestinian; Al-Saqqaf 1999: 162-3 for Hadrami; Al-Azraqi 1998: 144 for Abha). Examples from Cairene include:

(41)	/il + turki/	it-turki	'the Turk'
	/il + dēl/	id-dēl	'the tail'
	/il + ṭamāṭim/	iṭ-ṭamāṭim	'the tomatoes'
	/il + ḍarb/	iḍ-ḍarb	'(the) hitting'
	/il + sitt/	is-sitt	'the woman'
	/il + šams/	iš-šams	'the sun'
	/il + ṣalṣa/	iṣ-ṣalṣa	'the tomato paste'
	/il + lōn/	il-lōn	'the colour'
	/il + naṣṣ/	in-naṣṣ	'the text'
	/il + rās/	ir-rās	'the head'

In Cairene, but not in San'ani, *-l* of the article assimilates optionally to a following velar plosive. According to my Cairene informant, assimilation to a velar plosive is more likely to occur in fast speech. In careful speech, the forms in the left-hand column will be given, while in faster speech the forms in the right-hand column will be given.

(42) *il-gaṛas* ~ *ig-gaṛas* 'the bell'
il-kursi ~ *ik-kursi* 'the chair'

When the noun or adjective following the definite article begins with neither a velar plosive nor a coronal, no assimilation takes place.

(43)	/il + ḥāl/	il-ḥāl	'the state'
	/il + hilāl/	il-hilāl	'the crescent'
	/il + xēl/	il-xēl	'the horses'
	/il + ġada/	il-ġada	'lunch'
	/il + qurʔān/	il-qurʔān	'the Qur'an'
	/il + mudarris/	il-mudarris	'the teacher'
	/il + bint/	il-bint	'the girl'
	/il + ism/	il-ʔism	'the name'

In San'ani, *-l* of the definite article assimilates to a following coronal plosive, fricative, or sonorant.

(44)	/al + tīn/	at-tīn	'the fig'
	/al + ṯawr/	aṯ-ṯawr	'the bull'
	/al + ḏayl/	aḏ-ḏayl	'the tail'
	/al + ṭīn/	aṭ-ṭīn	'the mud'
	/al + ḏ̣ayf/	aḏ̣-ḏ̣ayf	'the guest'

/al + sayyārih/	*as-sayyārih*	'the car'
/al + šams/	*aš-šams*	'the sun'
/al + ṣayf/	*aṣ-ṣayf*	'the summer'
/al + naṣṣ/	*an-naṣṣ*	'the text'
/al + rās/	*ar-rās*	'the head'

As in Standard Arabic (Wright 1971: 15) and a number of Peninsula dialects including Hadrami (Al-Saqqaf 1999: 162–3), however, *-l* of the article fails to assimilate to a following palatoalveolar affricate /j/ in San'ani. The reasons for this are probably historical rather than phonological, since present-day /j/ goes back to a Proto-Semitic and pre-Classical Arabic voiced velar plosive **g* (cf. Section 1.1.1). Assimilation of *-l* predictably failed to take place before velar **g*, and this lack of assimilation persisted in several dialects even after **g* was fronted historically to a palatoalveolar affricate. San'ani contrasts with a number of modern dialects in which *-l* does assimilate to a following /j/ or /ʒ/. These include Central Sudanese (Persson and Persson 1979: 29; Hamid 1984: 106), Eastern Libyan (Abumdas 1985: 138), and Palestinian (Shahin 2000: 18). The assimilation of *-l* to a coronal plosive or continuant compares with non-assimilation when the initial consonant of the noun or adjective is either an affricate or a non-coronal.

(45)	*/al + ḥāl/*	*al-ḥāl*	'the state'
	/al + hilāl/	*al-hilāl*	'the crescent'
	/al + xuṭūbuh/	*al-xuṭūbuh*	'the engagement'
	/al + ġadā/	*al-ġadā*	'the lunch'
	/al + gurʔān/	*al-gurʔān*	'the Qur'an'
	/al + jayš/	*al-jayš*	'the army'
	/al + kursī/	*al-kursī*	'the chair'
	/al + mahr/	*al-mahr*	'the bride-price'
	/al + bint/	*al-bint*	'the girl'

In both Cairene and San'ani assimilation of *-l* is clearly a lexical process since /l/ within any other morpheme fails to assimilate totally to a following coronal obstruent (or velar plosive), although it does assimilate to a following sonorant, /r/ or /n/ (see Section 9.2.2). The examples of assimilation in (41), (42), and (44) compare with those in (46) in which assimilation fails to take place.

(46)	*Cairene*	*Gloss*	*San'ani*	*Gloss*
	iltihāb	'swelling'	*iltafat*	'he turned round'
	alṭaf	'nicer'	*balṭū*	'overcoat'
	ilsina	'tongues'	*alsinih*	'tongues'
	aldaġ	'having defective pronunciation m.s.'	*yildaᶜ*	'he strikes lightly'
	malṣūʔ	'glued m.s.'	*yilṣuʔ*	'it m. burns'
	istilzāz	'finding enjoyable'	*malzūm*	'necessary'
	ma naʔalš	'he didn't move'	*mā daxalš*	'he didn't go in'
	malkūz	'poked m.s.'		

That total assimilation of *-l* of the article to a following coronal is a synchronic process is evident from assimilations to initial coronals in recently adapted loan words in the dialects:

(47) (a) San'ani

/al + taks/	*at-taks*	'the taxi'
/al + dūš/	*ad-dūš*	'the shower'
/al + šukalātih/	*aš-šukalātih*	'the chocolate'
/al + saykal/	*as-saykal*	'the bicycle'
/al + ṣayf/	*aṣ-ṣayf*	'the summer'

(b) Cairene

/il + tirut/	*it-tirut*	'the trot'
/il + diblōm/	*id-diblōm*	'the diploma'
/il + sintēr/	*is-sintēr*	'the body hold (wrestling)' ⟨Fr. ceinture⟩
/il + šambazi/	*iš-šambazi*	'the chimpanzee'
/il + galūb/	*ig-galūb ~ il-galūb*	'the gallop'
/il + kantar/	*ik-kantar ~ il-kantar*	'the canter'
/il + ʒakitta/	*iʒ-ʒakitta*	'the jacket'

In order to test the productivity of *-l* assimilation in Cairene further, I gave my Cairene informant a set of nonce words with initial coronals or velar plosives. She pronounced the words and then defined them by means of the article. Coronal-initial words were pronounced with total assimilation of the article to the following coronal. In the case of words with initial velar plosives, my informant explained that 'the /l/ would not be pronounced if you spoke quickly or didn't think while you were speaking'. In word-list readings, however, no assimilation of *-l* to /k, g/ took place. The following forms were elicited:

(48)

Cairene	*Non-defined*	*Defined*
	safār	*is-safār*
	tarāb	*it-tarāb*
	ṭarāk	*iṭ-ṭarāk*
	ḍēl	*iḍ-ḍēl*
	ẓabba	*iẓ-ẓabba*
	šarām	*iš-šarām*
	ratāb	*ir-ratāb*
	ʒīli	*iʒ-ʒīli*
but	*karāt*	*il-karāt*
	garād	*il-garād*

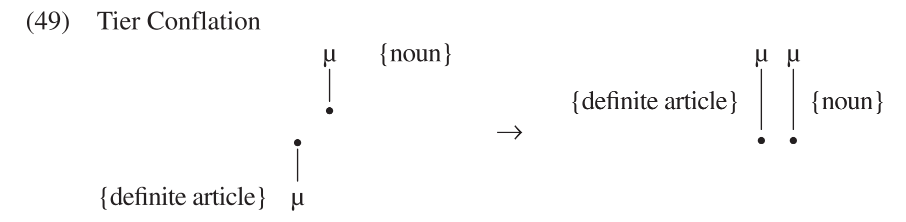
In view of the fact that a velar plosive is dominant with respect to a coronal, and that anticipatory assimilation of *-l* to a coronal is obligatory while assimilation to a velar occurs only in fast, casual speech, I assume that Cairene *-l* assimilation involves two separate processes. Assimilation to a following coronal is motivated

by an OCP violation on the coronal tier. Assimilation to a following velar plosive is motivated by the dominance of the trigger (/k, g/) in relation to the weakness of the undergoer (/l/).

8.2.2.1 *Assimilation of* -l *to a coronal*

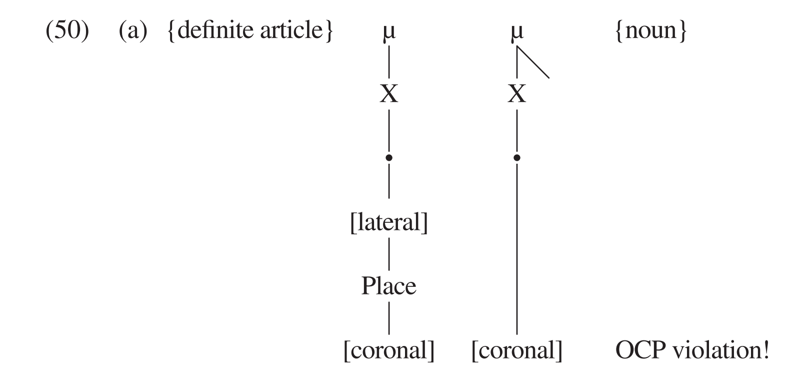
Total assimilation of -*l* to a following coronal is due to an OCP violation on the coronal tier within a specific morphological domain. TC occurs prior to assimilation since the coronal consonant of the noun has to be linearly adjacent and visible to -*l* of the definite article in order to trigger the OCP violation; however, we have also seen that assimilation to a coronal obstruent occurs only in case the undergoer is -*l* of the definite article. This indicates that while TC erases the phonological cue for morphemic distinction, it is not equatable with the erasure of morphological information. Assimilation of -*l* of the article to a following coronal applies in two stages: at stage one, TC acts to fold together the morphemes in a linear configuration:

(49) Tier Conflation

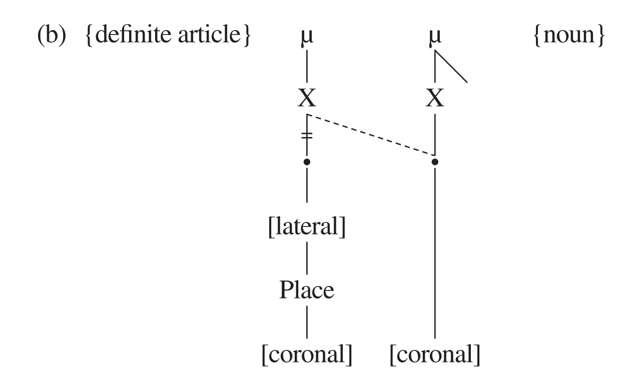


The morpheme nodes are still present at the point of linearization. At stage two, an OCP violation is apparent on the coronal tier within a specific morphological domain. In response to the OCP violation, the root node of the leftmost matrix (the matrix associated with /l/) is deleted. The vacuum created by deletion of the root node is filled by right-to-left spread of the root node of the adjacent coronal. The process is represented notationally in (50). (Only immediately relevant features represented; given the difficulties in representing three-dimensional structures two-dimensionally, in the following diagrams X-slots are used to represent elements of the skeletal tier.)

(50) (a)



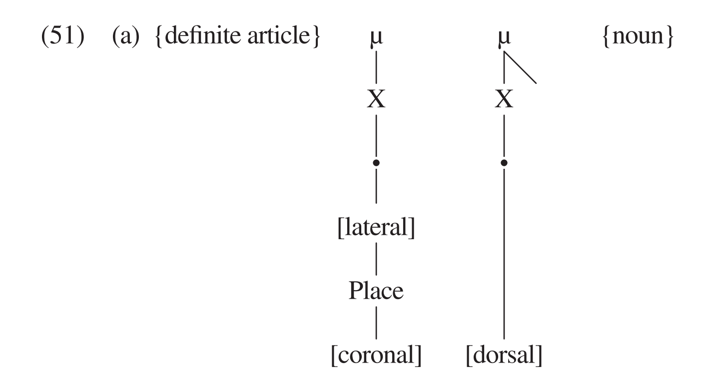
Deletion of leftmost root node and right-to-left spread of rightmost root node:



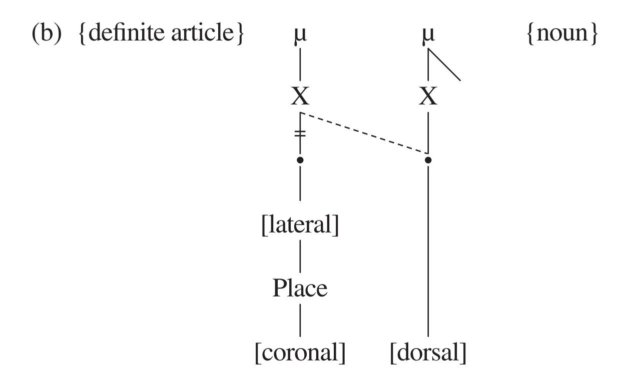
It is only at this point that erasure of morpheme nodes takes place, and the output is subject to post-lexical phonological processes. These include the devoicing of voiced geminate plosives in San'ani, and, in Cairene, the palatalization of coronal stops in the environment of palatal vocoids.

8.2.2.2 *Assimilation of* -l *to a velar plosive (in CA)*

The optional assimilation of -*l* to a velar plosive in Cairene is also a lexical process, since /l/ does not assimilate to /k/ within morphemes or across morphemes other than the definite article + noun/adjective. In this case, however, assimilation is not motivated by the OCP, but rather by the dominance of the trigger vis-à-vis the undergoer (cf. Mohanan 1993). Following TC, the velar plosive lies to the right of the [coronal] lateral. The velar plosive is now dominant by virtue of its position (the onset, the following element), its lack of sonority (the less sonorant element is dominant), and its place feature ([dorsal] is dominant with respect to [coronal], see (39)). In addition, the faster the speech the more likely assimilation will take place. Assimilation of -*l* to a following velar plosive is represented as deletion of the root node of the matrix associated with /l/, and right-to-left spread of the root node of the dominant feature matrix for /k, g/.



Deletion of leftmost root node and right-to-left spread of rightmost root node:



8.2.3 *Assimilation of* t- *of the detransitivizing prefix*

In Cairene, *t-* of the detransitivizing prefix (see Section 6.5.4) assimilates totally to a following coronal plosive and optionally to a following coronal sibilant. As with *-l* of the article, *t-* assimilates optionally to a velar plosive.

(52)	(a)	/*t + dāxil*/	*iddāxil*	'to interfere'
		/*t + ṭarrab*/	*iṭṭarrab*	'to be covered'
	(b)	/*t + sābiʔ*/	*issābiʔ~ itsābiʔ*	'to contend with'
		/*t + šaṭaf*/	*iššaṭaf ~ itšaṭaf*	'to be chipped'
		/*t + ṣabban*/	*iṣṣabban ~ itṣabban*	'to be soaped'
		/*t + kabb*/	*ikkabb ~ itkabb*	'to be poured'
		/*t + gawwiz*/	*iggawwiz ~ itgawwiz*	'to get married'

When *t-* is followed by a coronal sonorant or a labial or guttural consonant, no assimilation takes place irrespective of the speed of articulation.

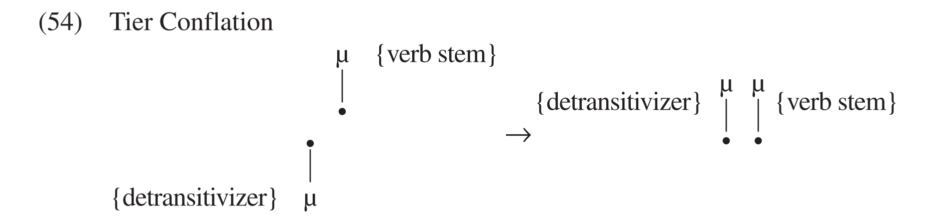
(53)	*itnākiš*	'to tease one another'
	itrakab	'to be ridden'
	itlafat + li	'to look after'
	itḥammil	'to bear'
	itfakkar	'to be reminded'
	itᶜawwaʔ	'to be made late'
	itballim	'to be stupefied'
	itmaxwil	'to be perplexed'
	itxayal	'to be distracted'
	itġalab	'to be overcome'

While the unmarked coronal stop assimilates in place and voice to a following marked coronal obstruent in the post-lexical component, and thus assimilations such as those in (52a) are attested in other areas of the phonology (see Section 9.2.4), total assimilation of /t/ to a following coronal sibilant or velar plosive fails

to occur when any other morphemes are involved. The examples in (52b) compare with forms such as *bi-tsīb* 'she/you m.s. leave (something)', *bi-tṣūm* 'she/you m.s. fast', *ma katabitš* 'she did not write', and *bi-tkubb* 'she/you m.s. pour/s', in which total anticipatory assimilation does not occur. This indicates that total assimilation of *t-* of the detransitivizing prefix to a following velar plosive or a coronal sibilant is a lexical process.

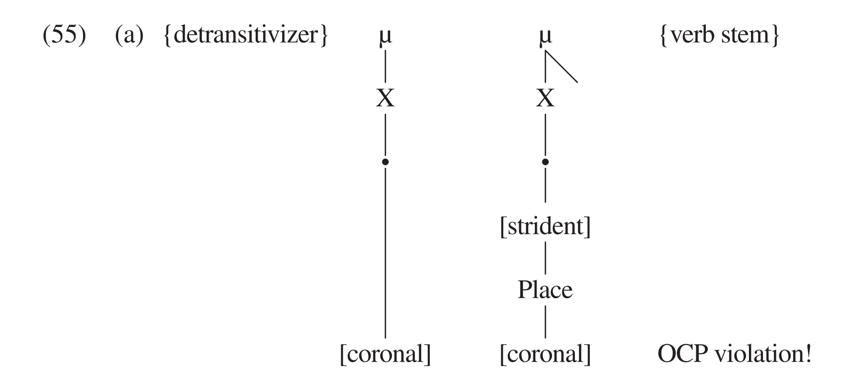
As for assimilation of *-l* of the definite article, assimilation of *t-* to a following coronal is motivated by an OCP violation on the coronal tier. Again, assimilation occurs in two stages. At stage one, TC acts to fold together the morphemes in a linear configuration.

(54) Tier Conflation

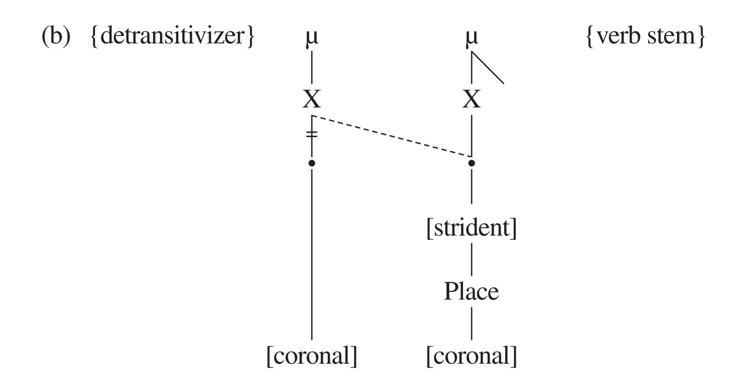


At stage two, an OCP violation is apparent on the coronal tier within a specific morphological domain. In response to the OCP violation, the root node of the leftmost matrix (the matrix associated with /t/) is deleted. The vacuum created by deletion of the leftmost root node is filled by right-to-left spread of the root node of the adjacent coronal. The assimilation of *t-* to a following sibilant is represented notionally in (55).

(55) (a)



Deletion of leftmost root node and right-to-left spread of rightmost root node:



At this point in the derivation, morpheme nodes are deleted, and the resulting configuration is a geminate sibilant. As for the optional assimilation of *-l* of the definite article to /k/, the optional assimilation of *t-* to a following /k/ is due to the strength of the trigger in relation to that of the undergoer.

In San'ani, metathesized *t-* of the detransitivizing prefix in form VIII, and the /t/ allomorph of the detransitivizing prefix in forms V and VI (see Section 6.5.4) and quadriliteral form II (see Section 6.5.6) assimilates totally to an adjacent coronal plosive or interdental fricative. Examples of assimilation include:

(56) *iḏ̣ḏ̣arab* 'he was hit'
yiḏḏakkar 'he remembers'
yiḏ̣ḏ̣ayyaf 'he is invited'
yiṯṯamman 'it m. is priced'
yiṭṭawwar 'it m. develops intr.'
yiḏ̣ḏ̣ārabū 'they m. fight each other'

In contrast to Cairene, however, assimilation does not take place before a coronal sibilant, nor before a velar plosive.

(57) *yitsā*^{c}*adū* 'they m. help each other'
yitṣabban 'he soaps himself'
yitšarraḥ 'he keeps in custody'
yitzāwarū 'they m. visit each other'
yitnāgašū 'they m. discuss with each other'
yitgabbab 'it m. becomes bitter'
yitkarkar 'he laughs'

As in Cairene, San'ani *t-* assimilation is motivated by an OCP violation on the [coronal] tier. However, the domain of the OCP is more limited than in Cairene, and only occurs when the coronal trigger shares lack of sonorancy and lack of stridency with *t-*.

8.3 CONCLUSION

In this chapter, I have considered prosodic and melodic processes which require access to morphological information. The majority of prosodic lexical processes apply prior to TC; however, the melodic processes considered here apply after TC but before the erasure of morphological information. These observations support the conclusion reached by Bat-El on the basis of evidence from Modern Hebrew that TC erases the phonological cue for morphemic distinction, but not the morphological cue. Morphological information is erased in two stages: stage one involves the linearization of morphemes through TC, stage two the erasure of morpheme nodes. Lexical processes may apply either prior to TC or after TC, but in all cases prior to the erasure of morpheme nodes. The melodic processes examined here also demonstrate that assimilation in Cairene is more pervasive than in San'ani: in the case of the definite article, *-l* assimilates only when the trigger is a coronal sonorant, plosive or fricative in San'ani, whereas *-l* may also assimilate to a velar plosive in Cairene. In the case of the detransitiving prefix, *t-* assimilates to an adjacent coronal plosive or interdental fricative in San'ani, but in Cairene may also assimilate to a velar plosive or coronal sibilant. The next chapter shows that assimilation in the post-lexical component is also more general a process in Cairene than it is in San'ani.

9

POST-LEXICAL PHONOLOGY

This chapter examines phonological processes which occur following complete Tier Conflation and the erasure of morpheme nodes. These processes do not require access to morphological information,[1] are purely phonologically conditioned, and may introduce or refer to non-contrastive segments (cf. Kaisse and Shaw 1985: 4–5). An example of the introduction of non-contrastive segments is nasal place assimilation in Cairene and San'ani where /n/ to the left of a labio-dental /f/ is realized as a labio-dental nasal—a sound which does not constitute part of the phoneme inventory. Another example is where the voiced bilabial stop /b/ is devoiced in utterance-final position in both dialects and realized as a voiceless bilabial stop—a sound which is not attested in the phoneme inventory of either dialect. As in Chapter 8, I consider prosodic processes and then melodic processes. Under melodic processes, I restrict the discussion in this chapter to local assimilation processes. The long-distance spread of emphasis is examined in Chapter 10 as part of a wider consideration of the phenomenon of phonological emphasis. While prosodic processes outweigh melodic processes in the lexical phonology, there are considerably more melodic than prosodic processes in the post-lexical phonology.

9.1 PROSODIC PROCESSES

Under prosodic post-lexical processes, I consider the shortening of unstressed long vowels in Cairene, the resolution of *V–V sequences in the dialects, and gemination of a clitic-final sonorant before a vowel-initial phonological word in San'ani. The shortening of unstressed long vowels is related to word-stress assignment; the resolution of *V–V sequences is a syllable-driven process; and gemination of a clitic-final sonorant is motivated by the requirements of the Prosodic Morphology Hypothesis. The mainly post-lexical syllable-driven processes of closed syllable shortening, closed diphthong shortening, epenthesis, glottal-stop prosthesis, and syncope are treated separately in Chapter 4.

9.1.1 *Unstressed long vowel shortening (in CA)*

In Cairene, long vowels are shortened if unstressed. Thus, with a very few lexical-

[1] Although they may refer to structure above the word (Archangeli 1984*b*: 8).

ized exceptions, of which *ṭālibāt* ‘students f.’ is one, no word has more than one long vowel. The few lexicalized exceptions are considered to be frozen high-level forms (usually from Standard Arabic), and do not constitute counter-evidence to the rule of unstressed long vowel shortening in Cairene.

Shortening of unstressed long vowels takes place in both derived and underived environments. In a word with two original long vowels, such as **ṣābūn* ‘soap’, stress is assigned to the final CVVC syllable, and the unstressed long vowel is shortened, to give *ṣabūn* ‘soap’. Similarly, broken plurals with two long vowels in Standard Arabic and in dialects such as San’ani are realized with a final stressed long vowel only in Cairene (cf. Section 6.6):

(1)

SA	*CA*	*Gloss*
^{c}*aṣāfīr*	^{c}*aṣafīr*	‘sparrows’
mafātīḥ	*mafatīḥ*	‘keys’

In all other derived environments, unstressed long vowels are shortened in Cairene:

(2)

/*bēt* + *ēn*/	*bitēn*	‘two houses’
/*yōm* + *ēn*/	*yumēn*	‘two days’
/*kitāb* + *ēn*/	*kitabēn*	‘two books’
/*ginēh* + *āt*/	*ginahāt*	‘pounds’
/*šāfu* + (*h*)/	*šafū*(*h*)	‘they saw him’

Unstressed long vowel shortening acts as a repair process in response to a constraint on unstressed long vowels. The repair process is expressed as mora deletion:

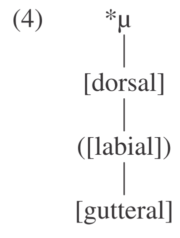
(3) μ μ

V

Condition: V is unstressed

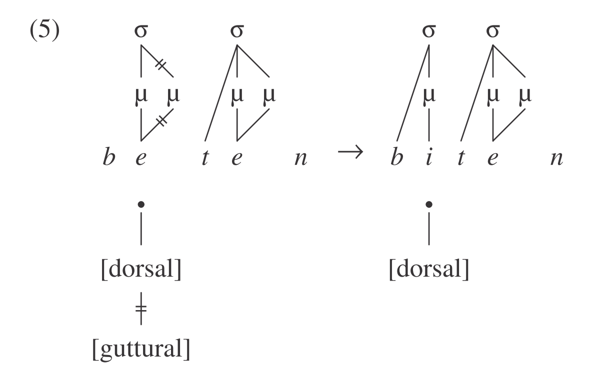
When the unstressed long vowel is either of the mid-vowels /ē/ or /ō/, the melody is subject to the negative constraint on monomoraic mid-vowels (see Section 3.4.11). This holds in all but the most careful speech of educated speakers (Harrell 1957: 55; Woidich 1999: 26, 49):

(4)



Once /ē/ or /ō/ loses its bimoraicity, non-primary [guttural] is pruned. Shortened /ē/ is realized as [i] and shortened /ō/ as [u].[2] This is exemplified in the shortening of unstressed /ē/ in */bēt + ēn/* > *bitēn* 'two houses':

(5)



9.1.2 *Resolution of *V–V sequences*

The minimum syllable in Cairene and San'ani is CV—that is, a syllable comprising an onset and a short vowel (see Sections 4.2 and 8.1.4). No syllable may begin with a vowel in either dialect. This is expressed as a requirement for syllables to take an onset, repeated in (6).

(6) σ

• μ

When the morphology concatenates a vowel-final morpheme with a vowel-initial morpheme in violation of (6), the ill-formed representation is subject to one of the following repair strategies: within the phonological word or clitic group,[3] one of the contiguous vowels is subject to deletion. Within the phonological phrase or utterance, either one of the vowels is subject to deletion, or the features of the leftmost vowel associate with the onset of the following syllable to produce a glide, or a glottal stop is epenthesized to form an onset to the unsyllabified rightmost vowel. Within the phonological word and clitic group, no optionality exists in either dialect, whereas within the phonological phrase and, more so between phonological phrases, the repair process adopted by the speaker is dependent on the speed of delivery and the relative amount of stress the rightmost word receives: the faster the delivery, the more likely vowel deletion will occur; the more stress the rightmost word receives, the more likely glottal stop epenthesis will occur. Cairene

[2] Where /ē/ occurs to the left of a syllable with a guttural consonant and guttural vowel, however, the shortened realization is [a], as in */ginēh + āt/* > *ginahāt*.

[3] With the exception of resolution of *V–V in the lexicon (see Section 8.1.4).

exhibits more phrase- and utterance-level vowel deletion and glottal epenthesis than San'ani, while San'ani exhibits more glide formation.

9.1.2.1 *Vowel deletion*

When the morphology concatenates a vowel-initial morpheme to the right of a vowel-initial morpheme, vowel deletion occurs to eliminate an onsetless syllable.[4]

(7)	(a)	Cairene	*/bi + aktib/*	*baktib*	'I am writing'
			/ma + agi + š/	*magīš*	'I am not coming'
			/wi + ana/	*wana*	'and me'
			/^{c}ala il-bēt/	*^{c}ala l-(bēt)*	'on the house'
	(b)	San'ani	*/mā + ismak/*	*bismak*[5]	'what is your m.s. name?'
			/wa + anā/	*wanā*	'and me'
			/fa + iḥna/	*fiḥna*	'so we'
			/bi + arba^{c}īn/	*birba^{c}īn*	'for forty'

Within the phonological phrase, vowel deletion is the most likely repair process to occur in Cairene, and occurs in casual speech in San'ani. Examples include:

(8)	(a)	Cairene	*/xallīni ašūf/*	*xallīn ašūf*	'let me look!'
			/da illi ana ^{c}ayzu/	*da ll ana ^{c}ayzu*	'that is what I want'
			/šuftu imbāriḥ/	*šuftu mbāriḥ*	'I saw him yesterday'
	(b)	San'ani	*/xallīnī absir/*	*xallīni bsir*	'let me look!'
			/^{c}alā ummī/	*^{c}al ummī*	'on my mother'
			/ya^{c}nī anā/	*ya^{c}ni nā*	'I mean I'
			/aštī azrag/	*ašti zrag*	'I want blue'

In Cairene, the identity of the deleted vowel in each case can be determined by observing the following hierarchy: /a/ takes precedence over /u, i/ and /u/ takes precedence over /i/. This is expressed informally in (9).

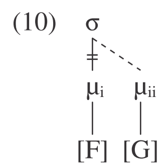
(9) *Cairene vowel hierarchy*
/a/ > /u/ > /i/

In a morphologically concatenated sequence /a/–/i/ (in either order), the deleted vowel will be the weaker vowel /i/, in a sequence /a/–/u/ the deleted vowel will be /u/, and in a sequence /u/–/i/ the deleted vowel will be /i/. In order to avoid an ad hoc statement such as '/u/ is deleted when adjacent to /a/, but not when adjacent to /i/', I assume that the process of vowel deletion has two aspects, one concerning the prosody and one the melody. In terms of the prosody, the leftmost vowel of the V–V sequence is deleted since the leftmost position is weaker with respect to

[4] The weakness of the glottal stop in glottal-stop-initial words, but in Cairene not in words in which the glottal stop is the reflex of Classical Arabic **q*, usually leads to glottal-stop deletion intervocalically and subsequent vowel deletion. Similarly, intervocalic *h*-deletion in San'ani leads to vowel deletion (see Section 8.1.5).

[5] With lexicalized dissimilation of the nasal /m/.

the rightmost (cf. Mohanan 1993; cf. Section 8.2); this is expressed as mora deletion on the prosodic template. The moraless syllable node then incorporates the following unsyllabified mora into its syllable. Where the vowel associated with μ_{ii} has equal or greater strength than the vowel associated with μ_i, the matrix of the μ_{ii} vowel simply remains with the newly incorporated mora. This is expressed diagrammatically in (10).

(10)


Where, on the other hand, the vowel associated with μ_{ii} has less strength than the vowel associated with μ_i, Dominance in Assimilation (see Section 8.2) assures that the more dominant one will override the less dominant vocalic matrix and associate with the newly incorporated mora:

(11) σ
μ_i μ_{ii}
[F] [G]

In the sequence /a/–/u/, as in *ana ummak* > *ana mmak* 'I am your m.s. mother', the stronger vocalic feature [guttural] spreads from the disassociated leftmost mora and crowds out the weaker feature [labial]:[6]

(12) σ
μ μ
[gutt] [lab]

In San'ani, the hierarchy of vowels and of vocalic features is the mirror image of that for Cairene: /u/ takes precedence over /i, a/, and /i/ takes precedence over /a/, expressed informally in (13).

(13) *San'ani vowel hierarchy*
/u/ > /i/ > /a/

Where two vowels of different quality are concatenated, the feature matrix of /u/ overrides the matrix associated with /i/, and the feature matrix of either /u/ or /i/ overrides the matrix associated with /a/. In San'ani, the phrase *anā ummak* is realized as *an ummak* with deletion of the matrix associated with /a/ rather than deletion of the matrix associated with /u/, as in Cairene, and in *yaᶜnī anā* 'I mean, I',

[6] The word stress associated with the deleted vowel is reassigned to the remaining vowel.

the matrix associated with the deleted leftmost mora associates with the remaining (rightmost) mora to give *ya^cni nā*.

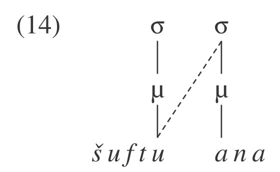
An analysis whereby the mora associated with the leftmost vowel is deleted and the feature matrix of the dominant vowel spreads from a deleted mora, expresses the independence of the prosody from the melody and demonstrates that features are lost if and only if overridden by features further up in the feature hierarchy of the language.

9.1.2.2 *Glide formation*

Within the phonological phrase, vowel deletion may resolve the anomaly of an onsetless syllable, as seen above. However, at or above this level in the prosodic hierarchy, vowel deletion is not obligatory. In both dialects, when the second word receives main sentence stress either glide formation or glottal stop epenthesis may apply to create an onset for the onsetless syllable. Of these two repair processes, glide formation is more common in San'ani, and glottal stop epenthesis more common in Cairene.

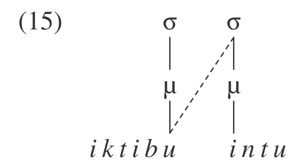
Whether vowel deletion or glide formation or glottal stop epenthesis take place may depend on speed of delivery, but may also depend on lexical considerations. For example, the vowel of the {third person masculine singular} object suffix is never subject to deletion in Cairene. In a phrase such as *šuftu ana* 'I saw him', vocalic features of the phonologically weaker phoneme /u/ associate with the syllable node of the following onsetless syllable to provide a glide onset, as in *šuftu* [*w*]*ana* 'I saw him'. Glide formation is represented as the feature matrix of the leftmost vowel spreading to associate with the syllable node of the following onsetless syllable:

(14)



Similarly, where the rightmost word is stressed, vowel deletion may fail to take place in favour of glide formation, as in: *iktibu* [*w*]*intu* 'you pl. write'.

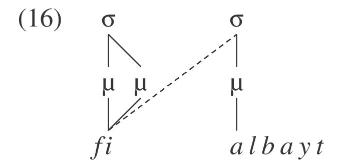
(15)



In San'ani, glide formation often occurs in careful speech, particularly before a vowel-initial content word, as in: *ʔabsartī ummī* 'you f.s. saw my mother' or *badaʔū yudxulū ahl al-bayt* 'the people of the house began to come in', which are usually realized as *ʔabsartī* [*y*]*ummī* and *badaʔū yudxulū* [*w*]*ahl al-bayt* respectively. However, in very slow, careful speech, glide formation may also occur before

vowel-initial function words and morphemes such as the definite article *al-* and the clausal definite article *allaḏī* ~ *allī* ~ *illī*. Thus, depending on the speed of delivery, 'in the house' can be realized as *fi l-bayt* (with CSS; see Section 4.4.1.3) or *fī* [*y*]*al-bayt*. The derivation of *fī* [*y*]*al-bayt* is diagrammed in (16).

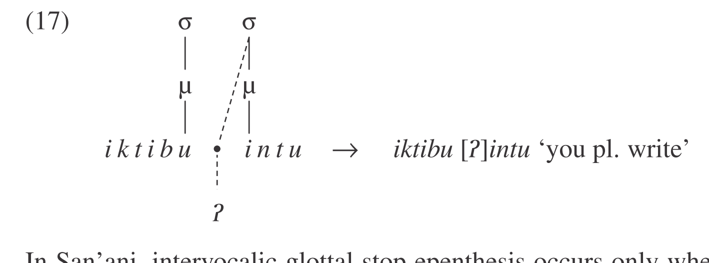
(16)



9.1.2.3 *Glottal stop epenthesis*

The final repair process invoked when the morphology concatenates a vowel-final and a vowel-initial morpheme is epenthesis of a glottal stop (Broselow 1976: 23–6).[7] This is a common process in Cairene, particularly before a vowel-initial content word which receives main sentence stress or which appears at the beginning of a phonological phrase. In non-utterance-final position, glottal stop epenthesis only ever occurs in foot-initial position—that is, to form the onset to a stressed syllable. Glottal stop epenthesis is represented as association of a syllable node with an empty onset (represented as a bullet on the segmental tier). The empty onset is then filled by the default consonant [ʔ]:

(17)

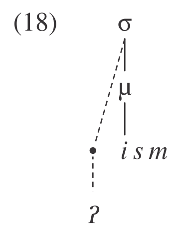


In San'ani, intervocalic glottal stop epenthesis occurs only when a vowel-initial word is stressed at the beginning of a phonological phrase, as in: *badaʔū yudxulū* [*ʔ*]*ahl al-bayt* 'the *people* of the house began to come in', *gadū* [*ʔ*]*aḥmar* 'it m. is *red*' and *gūlī* [*ʔ*]*uskut* 'say f.s. *shut up!*'.

In contrast to the two other repair processes, glottal stop epenthesis is not restricted to intervocalic position. Prosthesis of a glottal stop is the only repair process available in both dialects when a vowel-initial morpheme occurs in utter-

[7] In Watson (1989: 218–28, 1991), the glottal stop is argued to be the default post-lexical consonant in Arabic on account of its propensity to deletion in content words (see Section 2.1.11), its insertion to the exclusion of other consonants where the prosodic requirements of the language demand an onset, and its phonological lack of markedness: in the model adapted here, the glottal stop is distinguished by the place feature [guttural] and no other features. In the radical underspecification model of Watson (1989, 1991), in which a distinction is drawn between lexical and post-lexical default segments and features, the post-lexical glottal stop is underlyingly featureless and [guttural] is the default post-lexical feature.

ance-initial position. Vowel-initial morphemes which may occur utterance-initially are relatively rare in the two dialects. In Cairene, they include: *imta* 'when', the first and second person independent pronouns *ana* 'I', *inta* 'you m.s.' etc., the definite article *il-*, the relative pronoun *illi*, the first person imperfect prefix *a-* (as in *aktib* 'I write'), a few native content words such as *ism* 'name', *abb* 'father', *umm* 'mother', and a number of loan words including *iksibrēs* 'express' and *istub* 'stop!'. Vowel-initial morphemes which may occur utterance-initially in San'ani include: *inn* 'that', the definite article *al-*, the relative pronoun *allaḏī* ~ *allī* ~ *illī*, the first and second person independent pronouns *anā* 'I', *ant* 'you m.s.' etc., the first person imperfect prefix *a-* (as in *aktub* 'I write'), and a number of native content words and loan words. Vowel-initial words also result from prosthesis of a vowel before consonant clusters in the imperative of sound triliteral verbs, in the derived triliteral verb forms VII, VIII, IX, and X in both dialects, and in forms V, VI, and quadriliteral form II in Cairene (see Section 6.5.4). Utterance-initial glottal stop prosthesis is represented notionally in (18) (see Section 4.4.1.2).

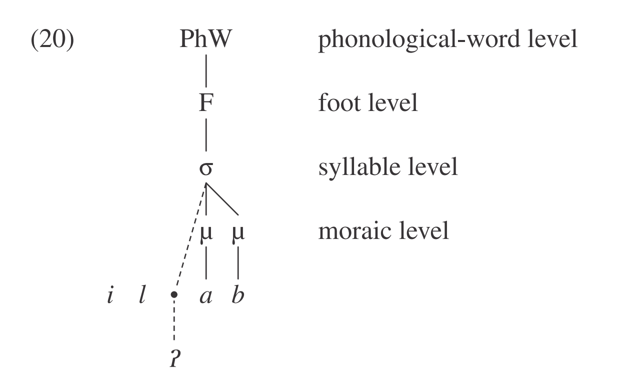
(18)


In Cairene, glottal stop prosthesis also occurs in careful speech in phonological-word-initial position, even when the word does not occur utterance initially or post-vocalically. This can be attributed to the requirements of the Prosodic Morphology Hypothesis which states that a phonological word must comprise at least one foot, a foot must comprise at least one syllable, and a syllable requires an onset. Therefore, in order that a phonological word fulfil the requirements of lower units in the prosodic hierarchy, a glottal stop may be prosthesized in careful speech when a vowel-initial phonological word occurs after a consonant-final phonological word. This will occur as an alternative to re-syllabification of the word-final consonant as the onset to the following onsetless syllable, as in the following examples (. delineates syllables in the bracketed examples).

(19)	*šāf* [ʔ]*ummi* (~ *ša.f um.mi*)	'he saw my mother'
	katab [ʔ]*imtiḥan* (~ *ka.ta.b im.ti.ḥān*)	'he wrote an exam'

In careful speech, a vowel-initial noun such as *abb* 'father' will also be subject to glottal stop prosthesis to the right of a consonant-final clitic such as the definite article or a monomoraic preposition.[8]

[8] Recall that the definite article is encliticized to the preceding phonological word and does not affect the prosodic status of the following noun or adjective (see Section 4.4).

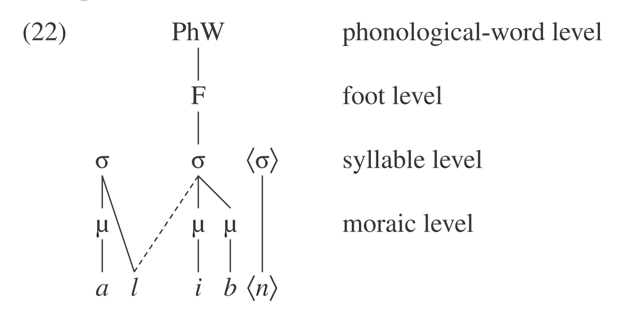


9.1.3 *Gemination of clitic-final sonorant (in SA)*

In San'ani, a glottal stop may be prosthesized in utterance-initial position or intervocalically in phonological-phrase-initial position, but is rarely prosthesized post-consonantally. When a vowel-initial noun or adjective is defined by the definite article or otherwise preceded by a sonorant-final clitic, the requirement for the phonological word to adhere to the prosodic requirements of the syllable is fulfilled by gemination of the clitic-final sonorant.[9] Examples of sonorant gemination before a vowel-initial word in San'ani include those in (21).

(21)	(a)	*/al + umm/*	*al-lumm*	'the mother'
		/al + ism/	*al-lism*	'the name'
		/al + ibn/	*al-libn*	'the son'
		/al + ab/	*al-lab*	'the father'
	(b)	*/min + ams/*	*minn ams*	'from yesterday'
		/min + awwal/	*minn awwal*	'from before'
		/ᶜan + ummī/	*ᶜann ummī*	'about my mother'
		/ᶜan + ams/	*ᶜann ams*	'about yesterday'

Gemination of the pre-vocalic sonorant is diagrammed as association of the sonorant directly with the syllable node of the following phonological word. This is exemplified in the derivation of */al-ibn/* > *al-libn* 'the son':



[9] The weakness of the glottal stop in glottal-stop-initial words results in glottal-stop deletion in this position, and subsequent sonorant gemination.

In a few cases, association of /l/ with the syllable node of a following vowel-initial phonological word has led to the historical reanalysis of vowel-initial nouns as /l/-initial:

(23) **adāh* → *ladāh* 'clothes'
**akamih* → *lakamih* pl. *likām* 'hill/s'

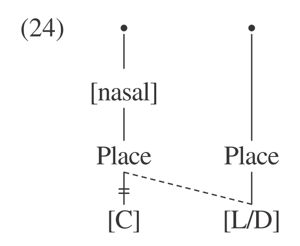
9.2 MELODIC PROCESSES

With the exception of the assimilation of adjacent gutturals, sonorant coronals, and sonorant dorsals, I argue that post-lexical melodic processes involve the undergoer assimilating a portion of the matrix of the trigger, even when the process results in the undergoer becoming identical with the trigger. This is the case in the assimilation of adjacent coronal sibilants in Cairene and, potentially, place assimilation of adjacent coronals. The assimilation of adjacent coronal sonorants, the assimilation of adjacent gutturals, assimilation of adjacent coronal sibilants, palatalization of [dorsal] plosives, labialization of [dorsal] plosives and labialization of [dorsal] vowels are motivated by the OCP on one of the [coronal], [guttural] or [dorsal] tiers. Palatalization and labialization processes which are not motivated by a violation of the OCP involve spread of a non-primary feature from the trigger to a compatible undergoer. Two processes considered in this section involve the delinking rather than the spreading of a feature. Geminate devoicing in San'ani, an instance of consonant fortition (see Section 9.2.6), involves the delinking of [voice] from doubly-linked plosives and affricates, and anticipatory devoicing involves the delinking of [voice] from an obstruent which is not followed by a [sonorant].

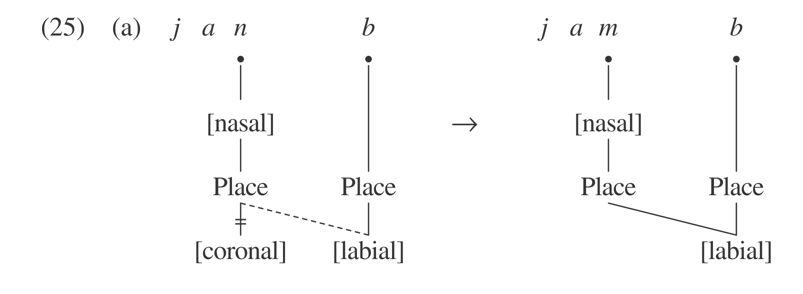
9.2.1 *Nasal place assimilation*

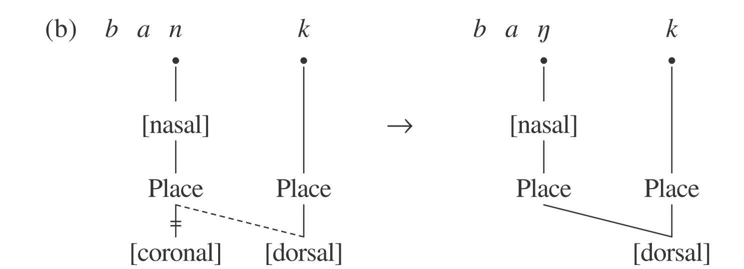
Nasal consonants in many languages are homorganic with a following obstruent (cf. Booij 1995: 64). In both Cairene and San'ani, underlying coronal nasals assimilate in place to an immediately following consonant. Nasal assimilation of place is obligatory within the phonological word, but optional within the phonological phrase. Nasals rarely assimilate to a following vocoid (the glides /w, y/), and universally fail to assimilate to segments lacking an oral place of articulation (the primary [guttural]s /h, ʔ, ḥ, ᶜ/). To the left of a [labial] or [dorsal] consonant, the unmarked nasal is weak in terms of its position (leftmost, the coda), its nasality, and its place feature [coronal] (cf. Section 8.2). In this position, the dominant place feature of the following consonant spreads from right to left overriding the weaker [coronal] feature, which is delinked. This is represented in (24).
Consider the derivations of San'ani *jamb* 'side' and *baŋk* 'bank':

(24)



(25)





In both dialects, clitic-final /n/ assimilates in place to a following consonant. The following forms are attested in San'ani:

(26)	*/min kam/*	*mi*[*ŋ*] *kam*	'from how many, much'
	/min fayn/	*mi*[*ɱ*] *fayn*	'from where'
	/min matā/	*mi*[*m*] *matā*	'from when'

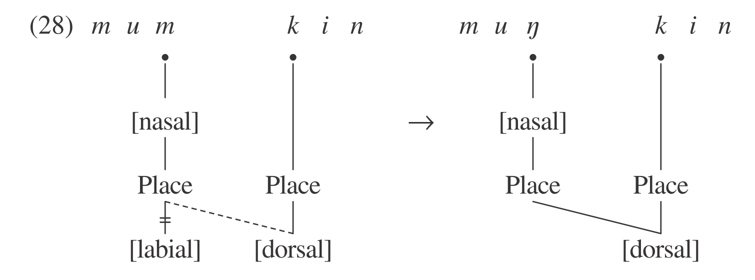
Nasal assimilation also occurs across phonological words within the phonological phrase. However, in careful speech, assimilation across phonological words may fail to occur. This is in accordance with Mohanan's observations that the larger the phonological domain, the less likely the application of a phonological rule (see Section 8.2). The alternants in (27) are attested in San'ani.

(27)

Underlying form	Assimilated form	Unassimilated form	Gloss
/al-yaman bilād/	*al-yama*[*m*] *bilād*	*al-yama*[*n*] *bilād*	'Yemen is a country'
/jālisīn masjūnīn/	*jālisī*[*m*] *masjūnīn*	*jālisī*[*n*] *masjūnīn*	'staying m.pl. imprisoned m.pl.'
/an-niswān fīhā/	*an-niswā*[*ɱ*] *fīhā*	*an-niswā*[*n*] *fīhā*	'the women in it f.'

In Cairene, but not in San'ani, the [labial] nasal /m/ may assimilate the place of a following velar plosive, but this process occurs only within the phonological word. Here the more dominant [dorsal] place feature of the velar plosive overrides the [labial] feature of the nasal: [dorsal] spreads from right to left, and the [labial] place feature of the nasal is delinked.

(28)



The degree to which adjacent consonants assimilate is greater in Cairene than in San'ani. In both dialects, place assimilation of adjacent coronals occurs within the phonological word. However, while assimilation of adjacent sibilants or adjacent coronal sonorants may occur within the phonological word in fast or casual speech in San'ani, it will be absent in careful speech and across phonological words. In Cairene, assimilation of adjacent coronal sonorants or sibilants occurs in all but the most careful of speech, and is usually not restricted to the phonological word. In the next section, I argue that sonorant assimilation, sibilant assimilation in Cairene, and place assimilation of an unmarked coronal to a marked coronal are motivated by an OCP violation on the [coronal] tier (cf. Section 8.2.2–3).

9.2.2 *Coronal sonorant assimilation*

The coronal sonorants (/n/, /l/, /r/) in Cairene optionally lose their manner of articulation and totally assimilate to a following coronal sonorant within the phonological word (29a)–(29c) or within the clitic group (29d)–(29e) (Harrell 1957: 43; Woidich 1999: 38).

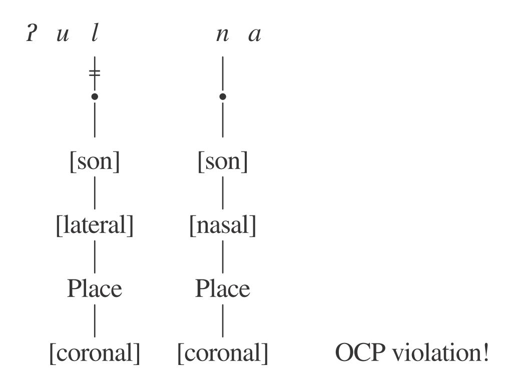
(29) (a) */kān + lu/* *ka*[*l*]*lu* 'it was to him; he had'
(b) */māl + na/* *ma*[*n*]*na* 'our property'
(c) */ʔul + na/* *ʔu*[*n*]*na* 'we said'
(d) */min riglēh/* *mi*[*r*] *riglēh* 'from his legs'
(e) */min litnēn/* *mi*[*l*] *litnēn* 'from the two'

Assimilation also occurs between phonological words within the phonological phrase,[10] as in (30).

(30) (a) */yi^{c}mil rufūf/* *yi^{c}mi*[*r*] *rufūf* 'he makes shelves'
(b) */sāfir libnān/* *sāfi*[*l*] *libnān* 'he travelled to Lebanon'
(c) */ḥasan li^{c}ib/* *ḥasa*[*l*] *li^{c}ib* 'Hasan played'
(d) */ḥasan rikib/* *ḥasa*[*r*] *rikib* 'Hasan rode'

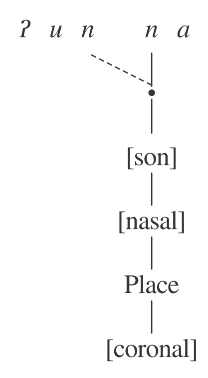
Assimilation of coronal sonorants to adjacent obstruents does not occur post-lexically, although it does occur lexically (see Section 8.2.2). The optional assimilation of /n/ to /t/ in */bint/* (= [*bint*] ~ [*bitt*]) 'girl' and */kunt/* (= [*kunt*] ~ [*kutt*]) 'I was/you m.s. were' in Cairene is restricted to these lexemes and is an isolated, lexicalized instance of the weaker sonorant assimilating the features of the dominant obstruent. It is assumed, therefore, that assimilation of adjacent coronal sonorants is motivated by a violation of the OCP on the [coronal] tier when adjacents agree in sonorancy (cf. McCarthy 1994: 206). Thus, the domain of the OCP in this instance is limited to [coronal] in the context of [sonorant] (see Section 8.2.1). The OCP violation is resolved by deletion of the leftmost root node, with right-to-right spread of the remaining root node to fill the vacuum left by deletion. *ʔunna* is derived from */ʔul + na/* 'we said' as in (31).

(31) (a) Deletion of leftmost root node



[10] Anticipatory asimilation of /n/ to /l, r/ occurs in a number of other modern Arabic dialects, including Omani (Shaaban 1977: 76), Central Sudanese (Hamid 1984: 150–2), and Eastern Libyan (Abumdas 1985: 136). In the Upper Egyptian dialect of Qift, /l/ assimilates to /n/ within the phonological word (Nishio 1994: 32).

(b) Spread of rightmost root node



Total assimilation of a coronal sonorant to a following coronal sonorant is less prevalent in San'ani than in Cairene. In this dialect, the weakest coronal sonorant /n/ usually assimilates totally to a following /l/ within the phonological word (32a); the more dominant /l/ assimilates to a following /n/ within the phonological word in fast, casual speech; however /r/ fails to assimilate to following /n/, and among many speakers fails to assimilate to following /l/ (32c). /n/ is not attested to the immediate left of /r/ within the phonological word, but clitic-final /n/ assimilates to both following /r/ and /l/ in casual speech (32d).

(32)	(a)	*/gālayn + lih/*	*gāla*[*l*]*lih*[11]	'they f. said to him'
	(b)	*/gul + nā/*	*gu*[*l*]*nā* ~ *gu*[*n*]*nā*	'we said'
		/nazal + nā/	*naza*[*l*]*nā* ~ *naza*[*n*]*nā*	'we went down'
	(c)	*/ʔabsar + nā/*	*ʔabsa*[*r*]*nā*	'we saw'
		/ḏ̣uhur + lak/	*ḏ̣uhu*[*r*]*lak* ~ *ḏ̣uhu*[*l*]*lak*	'is it clear to you m.s.?'
	(d)	*/man rafa^{c}/*	*ma*[*r*] *rafa^{c}*	'whoever lifts'
		/min rūmī/	*mi*[*r*] *rūmī*	'from maize'
		/min layl/	*mi*[*l*] *layl*	'from the night of . . .'

The assimilation of /n/ to /l/ and /r/ is motivated by an OCP violation on the [coronal] tier when coronals agree in sonorancy, which is resolved by deletion of the root node of the weaker leftmost matrix and right-to-left spread of the root node of the dominant matrix. When /l/ is followed by /n/, however, assimilation is restricted to fast, casual speech in San'ani because the leftmost matrix (containing [lateral]) is dominant with respect to the rightmost (containing [nasal]); when the more dominant liquid, /r/, is followed by /n/, assimilation fails to take place. Thus, while the dominant segment in Cairene sonorant assimilation is determined solely in terms of its position (the rightmost), in San'ani the dominant segment is determined both in terms of its position (rightmost) and in terms of its feature content.

[11] Plus closed diphthong shortening (see Section 4.4.1.3).

9.2.3 *Assimilation of adjacent sibilants*

When two sibilants come into contact within the phonological word or clitic group in Cairene, the leftmost sibilant assimilates the features of the rightmost. Examples given by Woidich (1999: 37) include:

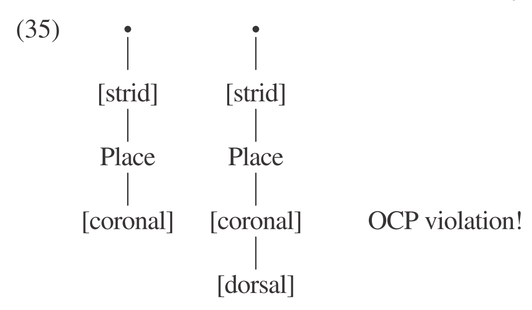
(33) *z* + *š* > *šš* /*ma xabazš*/ *maxaba*[*š*]*š* 'he didn't bake'
š + *z* > *zz* /*iš zayyak*/ *i*[*z*]*zayyak* 'how are you m.s.?'

When the leftmost sibilant is emphatic /ṣ/, however, the features of the dominant segment are assimilated by the weaker segment despite the undergoer occupying the dominant (rightmost) position:

(34) *ṣ* + *š* > *ṣṣ* /*ma-xallaṣš*/ *maxalla*[*ṣ*]*ṣ* 'he didn't finish'

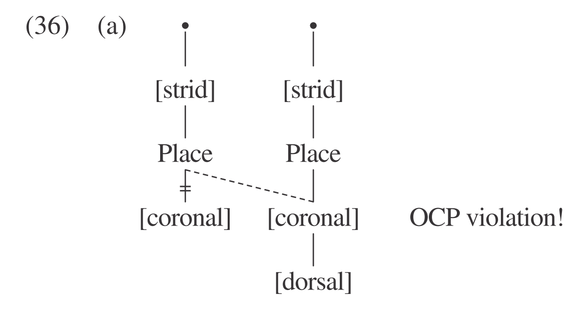
Harrell (1957: 41) implies that the cluster [sš] does occur in careful speech in negative combinations, although it is more likely to become [šš], and in word-final position is usually reduced to [š] (Harrell 1957: 42). Across phonological words, [šs] and [sš] may occur, as in: *mafīš sitta* 'there aren't six (of them)' and *fās šihāda* 'Shihada's mattock'. However, these clusters are more usually replaced by [ss] and [šš] respectively (Harrell 1957: 42). Likewise, the palatoalveolar sibilant of *miš* 'not' optionally assimilates to /s/ or /z/ as in *miz zayyu* 'not like him' (< /*miš zayyu*/) and *mis sahl* 'not easy' (< /*miš sahl*/) (Abdel-Massih 1975: 50), which demonstrates that a more marked sibilant may assimilate the features of a following less marked sibilant. I assume that the assimilation of sibilants occurs in consequence of a violation of the OCP on the [coronal] tier when adjacents agree in stridency:

(35)

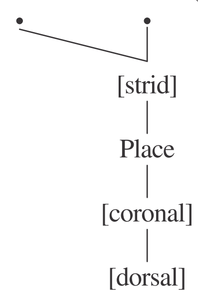


The OCP violation is repaired by deletion of the place features from the leftmost matrix. The empty place node is filled by spreading of the rightmost matrix:

(36) (a)

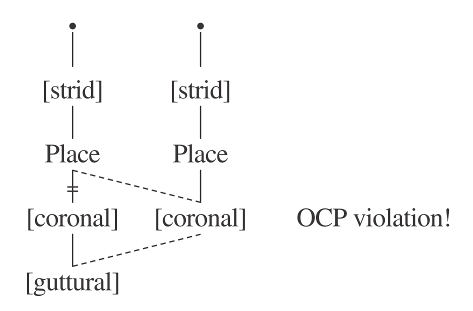


(b) Fusion of identicals ([strid]) gives the following representation

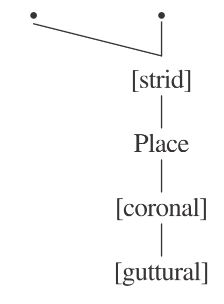


When a plain sibilant is adjacent to an emphatic sibilant, as in /ṣs/, however, the emphatic feature [guttural] of the dominant segment reassociates to the rightmost matrix following deletion of the place features from the leftmost matrix. This is in line with the observation that phonologically stronger features are dominant with respect to weaker features, and thus strong features are less likely to be lost than weak features. This analysis is similar to that proposed for vowel deletion in Section 9.1.2.1 where the dominant feature matrix occupies the less dominant position. Consider the representation in (37).

(37) (a) Deletion of leftmost place features, reassociation of [guttural], spread of remaining matrix



(b) Fusion of identicals ([strid])



In San’ani, sibilant place assimilation is attested in casual speech, but only in case the rightmost sibilant is dominant with respect to the leftmost. Thus, the mechanism of sibilant place assimilation resembles that of sonorant assimilation in San’ani—dominancy is determined both in terms of the relative position and in terms of the relative strength of the undergoer vis-à-vis the trigger. In *mā darasš* ‘he did not learn’, the relatively weak /s/ may assimilate the palatality (non-primary [dorsal]) of the palatoalveolar sibilant; when the order of the sibilants is reversed, however, as in *miš sahl* ‘not easy’, the dominant palatoalveolar sibilant resists assimilation to /s/. Similarly, in *mā xallaṣš* ‘he did not finish’ the more dominant pharyngealized sibilant will resist assimilation. As in Cairene, this form may be realized as [*mā xallaṣṣ*], whereby the dominant non-primary [guttural] feature from the deleted matrix reassociates rightwards overriding the less dominant non-primary [dorsal] feature of the palatoalveolar.

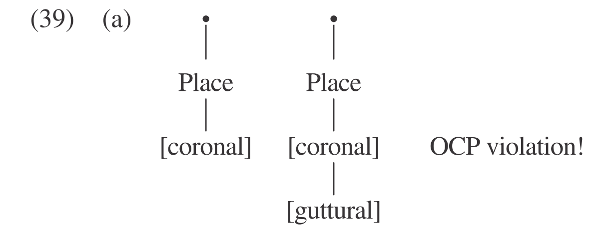
9.2.4 *Coronal place assimilation*

The assimilation of adjacent sibilants is related to a more general process of [coronal] place assimilation attested in both dialects. As in a large number of other languages, a plain [coronal] stop assimilates the place features of a following marked [coronal] obstruent. A plain coronal stop becomes palatoalveolar to the left of a palatoalveolar, pharyngealized to the left of a pharyngealized coronal and interdental to the left of an interdental, as in the following examples from Cairene (left-hand column) and San’ani (right-hand column).

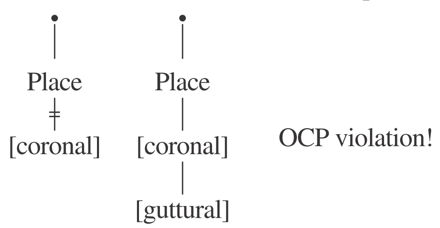
(38)		*CA*		*SA*	
	palatoalveolar	*madšūt*	‘disregarded’	*yitšakkar*	‘he thanks’
		in šaḷḷāh	‘if God wills’	*in šāʔ aḷḷāh*	‘if God wills’
	pharyngealized	*yiṭṣabban*	‘he soaps h.s.’		
		(~ *yiṣṣabban* cf. Sect. 8.2.3)		*yiṭṣabban*	‘he soaps h.s.’
		maḷṭūx	‘soiled’	*yiḷṣuʔ*	‘it lights intr.’
	interdental	NA		*gad ṯār*	‘he took revenge’

Coronal place assimilation is again motivated by an OCP violation on the [coronal] tier with repair by means of deletion of the leftmost matrix from the place node. The place features associated with the rightmost matrix spread from right-to-left to associate with the vacated place. The anticipatory assimilation of a plain to a pharyngealized coronal takes place as in (39).

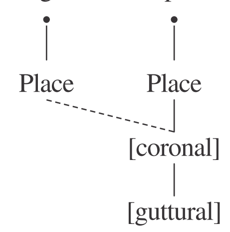
(39) (a)



(b) Deletion of leftmost matrix from place node

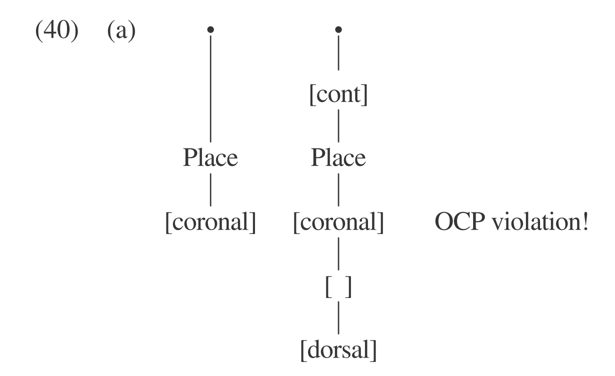


(c) Right-to-left spread of rightmost matrix

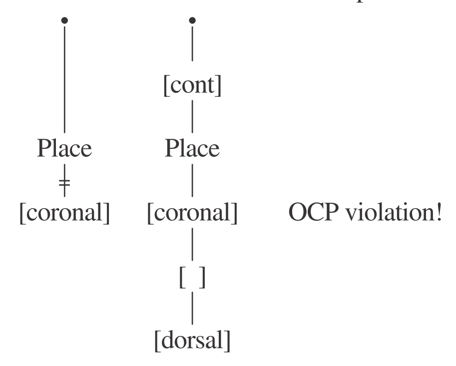


When a plain coronal stop assimilates the place of a marked fricative—/š/ in either dialect or an interdental fricative in San'ani—the plain coronal assimilates the place features of the marked coronal but not the stricture feature [cont] or, in the case of the sibilant, the acoustic feature [strident]. The place assimilation of a plain coronal to an interdental fricative in San'ani takes place as in (40).

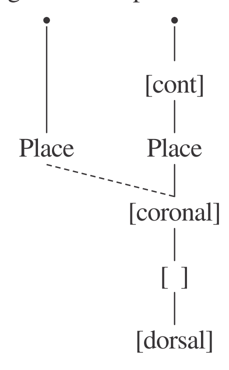
(40) (a)



(b) Deletion of leftmost matrix from place node



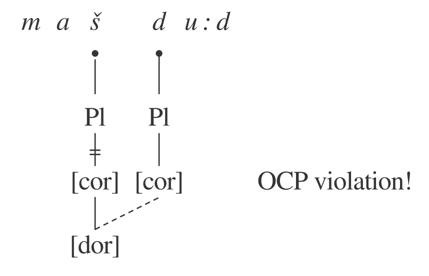
(c) Right-to-left spread of rightmost matrix



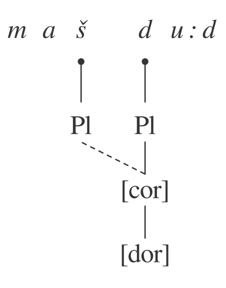
This process results in a geminate interdental affricate which contrasts with the geminate interdental fricative attested when *t*- of the detransitivizing prefix assimilates totally to an adjacent interdental fricative in the lexical component (see Section 8.2.3).

When a marked [coronal] is followed by an unmarked coronal stop, the non-primary feature(s) associated with the deleted matrix may reassociate rightwards in both dialects prior to matrix spread. This is exemplified in (41) (non-place features ignored in the representation).

(41) (a) Deletion of leftmost matrix from place node, reassociation of [dorsal]



(b) Right-to-left spread of rightmost matrix



9.2.5 *Voicing assimilation (in CA)*

In Cairene, an underlyingly voiceless obstruent assimilates [voice] from a following voiced obstruent within the phonological word. In casual speech or when adjacent obstruents share a place of articulation, voicing assimilation may also occur across phonological words (cf. Harrell 1957: 32 ff.; Woidich 1999: 36). Assimilation of [voice] is expressed informally in (42).

(42) Ci → Ci / ___ Cii
[voice] [voice]

Examples of anticipatory voicing in Cairene include the following (from Woidich 1999: 36):

(43)				
	k + d > gd	*/yikdib/*	*yi[g]dib*	'he lies'
	k + z > gz	*/yikzib/*	*yi[g]zib*	'he lies'
	x + z > ġz	*/maxzan/*	*ma[ġ]zan*	'store'
	x + d > ġd	*/yixdim/*	*yi[ġ]dim*	'he works, serves'
	s + g > zg	*/masgūn/*	*ma[z]gūn*	'imprisoned'
	f + ḍ > vḍ	*/yifḍal/*	*yi[v]ḍal*	'he remains'
	x + ġ > ġġ	*/nusax ġalya/*	*nusa[ġ] ġalya*	'expensive copies'

Voicing assimilation does not take place before sonorants, or before the voiced pharyngeal /ᶜ/.

(44)				
	s + m > sm	*/masmūḥ/*	*masmūḥ*	'permitted'
	s + r > sr	*/masraḥ/*	*masraḥ*	'theatre'
	ṣ + l > ṣl	*/faṣl/*	*faṣl*	'class'
	t + r > tr	*/litr/*	*litr*	'litre'
	s + ᶜ > sᶜ	*/tisᶜal/*	*tisᶜa*	'nine'
	t + ᶜ > tᶜ	*/yitᶜab/*	*yitᶜab*	'he becomes tired'

Just as non-obstruents do not induce voicing in a preceding obstruent, voiceless non-obstruents do not assimilate [voice] from a following voiced obstruent. The voiceless gutturals /ḥ, h, ʔ/ fail to assimilate [voice] from a following voiced obstruent.

(45)	*ḥ + d > ḥd*	*/maḥdūd/*	*maḥdūd*	'limited'
	ḥ + b > ḥb	*/maḥbūb/*	*maḥbūb*	'loved'
	h + z > hz	*/mahzaʔa/*	*mahzaʔa*	'scorn'

When a voiceless guttural falls to the left of the voiced pharyngeal /^{c}/, however, total anticipatory assimilation occurs.

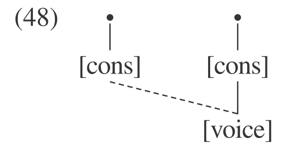
(46)	*ʔ +* ^{c} *>* ^{cc}	*/yuʔ^{c}ud/*	*yu[^{c}]^{c}ud*	'he stays'
	ḥ + ^{c} *>* ^{cc}	*/rāḥ ^{c}al-bēt/*	*rā[^{c}] ^{c}al-bēt*	'he went home'

While anticipatory voicing has a number of exceptions, anticipatory devoicing in Cairene affects all non-sonorants, including the primary gutturals. Examples include the following (from Woidich 1999: 37):

(47)	*d + t > tt*	*/xadtu/*	*xa[t]tu*	'you pl. took'
	d + x > tx	*/madxal/*	*ma[t]xal*	'entrance'
	d + k > tk	*/baladkum/*	*bala[t]kum*	'your pl. village'
	b + t > pt	*/katabt/*	*kata[p]t*	'I/you m.s. wrote'
	g + s > ks	*/agsām/*	*a[k]sām*	'bodies'
	z + t > st	*/xabazt/*	*xaba[s]t*	'I/you m.s. baked'
	ġ + f > xf	*/ruġfān/*	*ru[x]fān*	'loaves of bread'
	^{c} *+ t > ḥt*	*/bita^{c}ti/*	*bita[ḥ]ti*	'belonging to me'
	^{c} *+ h > ḥḥ*	*/ma^{c}had/*	*ma[ḥ]ḥad*	'institute'

In a model in which phonological features are unary and therefore the only active laryngeal feature is [voice], anticipatory devoicing appears to be problematic. However, in contrast to anticipatory voicing, there is no failure in anticipatory devoicing. I assume this asymmetry to result from the interaction of two separate processes, as in Lombardi (1991, 1995, 1996). Anticipatory assimilation of [voice] is the result of a right-to-left spread process in which [voice] spreads from a voiced obstruent to an obstruent which is not specified for voice—see (48).

(48)

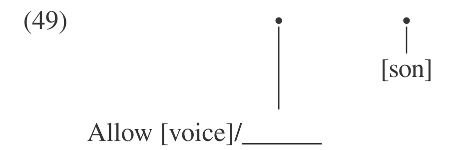


Apparent anticipatory assimilation of voicelessness, by contrast, is due to a constraint on [voice] in non-sonorants when not followed by a tauto- or heterosyllabic sonorant. As in Lombardi, the devoicing of voiced non-sonorants is expressed as a 'positive' condition, rather than as a rule.[12] In Cairene, this 'positive' condition

[12] Observing that obstruents in the syllable appendix as well as the syllable coda are realized as voiceless in German, Lombardi expresses the constraint as the licensing of [voice] in obstruents when followed by a tautosyllabic sonorant, but not elsewhere (Lombardi 1991). In Cairene and San'ani, voiced obstruents occur to the left of sonorant stops as well as vowels, therefore the condition is generalized to license [voice] in obstruents to the left of a sonorant.

licenses [voice] in non-sonorants when followed by a sonorant, with no commitment as to the syllable position of the following sonorant:

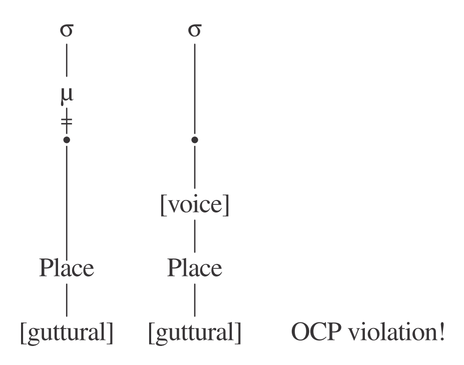
(49)



In all other positions, [voice] is delinked from a non-sonorant. This 'positive' condition accounts for the maintenance of [voice] in syllable-onset position, as well as in syllable-coda position before a sonorant onset. Thus, apparent anticipatory devoicing results not from the spreading of [−voice], but rather from the delinking of [voice] from a non-sonorant when not followed by a sonorant. The effects of (49) will be overridden by right-to-left spread of [voice] (48) when an obstruent is followed by a voiced obstruent. Thus it is partly the conflict between right-to-left spread of [voice] and the licensing of [voice] in non-sonorants to the left of sonorants which leads to the apparent asymmetrical position with regard to adjacent consonants which differ in respect to [voice].

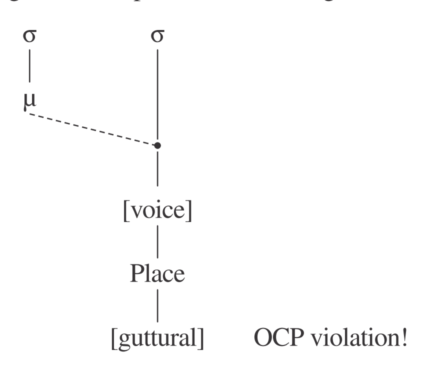
[Voice] does not spread from sonorants or from the voiced primary guttural /ᶜ/ since spread of [voice] (48) is restricted to obstruent triggers, a restriction itself due to the relative weakness of the non-obstruent in the syllable onset vis-à-vis the obstruent in the syllable coda. The only instance in which /ᶜ/ initiates spread of [voice] is where the undergoer is /ḥ/, /h/ or /ʔ/, in which case undergoer and trigger share a primary [guttural] place of articulation. The total anticipatory assimilation of a voiceless guttural to /ᶜ/ is expressed as follows:[13] adjacent gutturals are prohibited absolutely, constituting a violation of the OCP on the [guttural] tier. The OCP violation is resolved by deletion of the root node of the leftmost segment (cf. Section 9.2.2). The vacuum left by root-node deletion is filled by spread of the rightmost root node. Thus, /ʔ/ assimilates to /ᶜ/ as in (50).

(50) (a) Deletion of leftmost root node



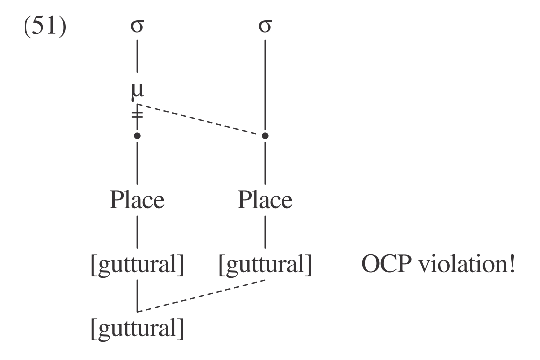
[13] This is similar to assimilation of adjacent coronal sonorants discussed in Section 9.2.2. However, adjacent gutturals are banned absolutely in both Cairene and San'ani, whereas adjacent sonorant coronals may be attested in San'ani if the leftmost sonorant is dominant with regard to the rightmost.

(b) Right-to-left spread of remaining root node



When the leftmost place matrix is more marked than the rightmost, the marked place feature of the deleted matrix reassociates rightwards. In both Cairene and San'ani, non-primary [guttural] reassociates rightwards from the pharyngeal in pharyngeal–laryngeal sequences. The rightmost matrix then spreads from right to left to fill the vacuum left by deletion of the leftmost matrix:

(51)



The reassociation of marked place features ensures that words such as *yuʔ*^{c}*ud* 'he stays' (CA) and *ma*^{c}*had* 'institute' are realized as *yu*^{cc}*ud* and *maḥḥad*.

9.2.6 *Voicing, devoicing, and geminate devoicing (in SA)*

In a paper published in 1984, Jastrow observed that geminate plosives and affricates are realized without voice in San'ani. Thus, /gg/ is realized as [kk], /bb/ as [pp], /dd/ as [tt] and /jj/ as [t:š]. Examples include:

(52)

/*ḥagg*/	*ḥa*[*kk*]	'right, belonging to'
/*ḥaddād*/	*ḥa*[*tt*]*ād*	'blacksmith, iron-worker'
/*ḥubb*/	*ḥu*[*pp*]	'love'
/*ḥijj*/	*ḥi*[*t:š*]	'pilgrimage'

Geminate devoicing is clearly a post-lexical process because it occurs not only within morphemes but also across morphemes. In this latter case, the undergoer

may be a geminate which results from a previous assimilation process. The *-l* of the definite article assimilates totally to a following coronal stop or fricative (but not to the affricate /j/) (see Section 8.2.2). When *-l* of the article is followed by a voiced coronal stop, total assimilation takes place and the resulting representation is subject to geminate devoicing:

(53)	*/al-dāyir/*	> *ad-dāyir*	*a*[*t-t*]*āyir*	'the key'
	/al-dawm/	> *ad-dawm*	*a*[*t-t*]*awm*	'the dowm fruit'

Jastrow observed correctly that geminate devoicing does not affect the sonorants /nn/, /mm/, /ll/, /rr/, /ww/, /yy/, or the continuants /zz/, /ḏḏ/, /ḏ̣ḏ̣/, /ġġ/. We have already seen that continuants are less likely to undergo an assimilation process than non-continuants. This observation can be generalized to the claim that continuants are more likely to maintain their underlying feature specification than non-continuants. The lack of devoicing of geminate sonorants can be attributed to the Elsewhere Condition (Kiparsky 1982), which states that where two rules/constraints are in conflict, the more specific rule/constraint takes precedence over the less specific one. The Elsewhere Condition is formulated as follows (from Kiparsky 1982: 136):

(54) *Elsewhere Condition*
Rules A and B in the same component apply disjunctively to a form C iff:
(a) The structural description of A (the special rule) properly includes the structural description of B (the general rule);
(b) The result of applying A to C is distinct from applying B to C. In that case, A is applied first, and if it takes effect, B is not applied.

Geminate sonorants fail to devoice because the more specific segment structure requirement [sonorant] > [voice] overrides the cross-segmental requirement of geminate devoicing (cf. Mohanan 1993: 107–8).

Geminate devoicing is partly due to the licensing of [voice] in obstruents when followed by a sonorant, and not elsewhere (see Section 9.2.5). It is also due to the coordinates of segment strength as laid out by Mohanan (1993: 103), and to the principle of Geminate Integrity. I shall consider these three factors in turn.

San'ani exhibits apparent anticipatory devoicing, but a far more limited degree of anticipatory voicing than Cairene. Anticipatory voicing does not always take place, and the degree of voicing appears to be directly proportional to the strength of the trigger, the weakness of the undergoer, the speed of delivery, and the casualness of speech. The least dominant segment is more likely to undergo voicing assimilation than the most dominant, and the most dominant segment more likely to trigger voicing assimilation than the least dominant. The dominance scale for oral place is laid out in (55) (from Mohanan 1993: 91).

(55)	*Least dominant*		*Most dominant*
	alveolar	palatal labial	velar

In San’ani, a voiceless plosive assimilates [voice] from a following voiced plosive or affricate, and, in casual speech, from a following voiced fricative; by contrast, a voiceless fricative will only assimilate [voice] from a following voiced fricative. Within the set of voiceless plosives, the coronals /t/ and /ṭ/ invariably assimilate [voice] from a following voiced plosive or affricate, while velar /k/ assimilates [voice] in casual speech only. Within the set of fricatives, labial /f/ and the non-sibilant coronals almost invariably assimilate [voice] from a following voiced fricative, but the sibilants and the velar fricative /x/ assimilate [voice] in fast, casual speech only. Examples of voicing assimilation include the following:

(56)	*/yitgarṭaṭ/*	*yi[d]garṭaṭ*	‘he gets annoyed’
	/yitba^c*/*	*yi[d]ba*^{c}	‘he follows’
	/xuṭbih/	*xu[ḍ]buh*	‘sermon’
	/akbar/	*a[g]bar ~ a[k]bar*	‘bigger, older’
	/lafḏ̣/	*la[v]ḏ̣*	‘expression, pronunciation’
	/afḏ̣al/	*a[v]ḏ̣al*	‘better’
	/maxzan/	*ma[ġ]zan ~ ma[x]zan*	‘store’

Instances in which anticipatory voicing regularly fails to take place include combinations in which the potential trigger is a non-obstruent—that is, a primary [guttural] or sonorant—as in Cairene, or the potential undergoer and trigger differ in continuancy.[14] The voiceless gutturals /h/, /ʔ/ and /ḥ/ do not assimilate voice from a following obstruent, although they do exhibit total assimilation to a following voiced pharyngeal, as in Cairene (see Section 9.2.5). Examples of the failure of anticipatory voicing from my data include those in (57).

(57)	*/aswāg/*	*aswāg*	‘markets’
	/muxlāṣ/	*muxlāṣ*	‘silver’
	/bi-kaṯrih/	*bi-kaṯrih*	‘a lot’
	/šakl/	*šakl*	‘form’
	/^{c}*ahd/*	^{c}*ahd*	‘era’
	/yiḥmil/	*yiḥmil*	‘he bears, carries’
	/maxbazih/	*maxbazih*	‘bread cushion’
	/axdam/	*axdam*	‘I serve’
	/asbāb/	*asbāb*	‘reasons’
	/ašgā/	*ašgā*	‘I work’
	/yikḏib/	*yikḏib*	‘he lies’

The observation that anticipatory voicing is more likely to target stops than non-stops, that coronals are more likely to be affected than non-coronals, and that non-sonorants, but not sonorants, trigger anticipatory voicing accords with (a), (c), and

[14] Haddad (1984, cited in Lombardi 1996: 18–19) observes for Lebanese that while a stop will assimilate the voicing value of a following stop or fricative, a fricative will only assimilate the voicing value of a following fricative. Thus, */ʔafz/* ‘jumping’ is realized as [*ʔavz*] (or [*ʔafiz*] with epenthesis) and */lafẓ/* ‘pronunciation’ as [*lavẓ*] (or [*lafiẓ*] with epenthesis), but */wizk/* ‘victory’ is realized as [*wizk*] and */hiz-t/* ‘I got furious’ as [*hizt*].

(d) of Mohanan's generalizations regarding asymmetries in place assimilation, as in (58) (Mohanan 1993: 76–7).

(58) *Asymmetries in Place Assimilation*
- (a) Coronal asymmetry
  - i. If non-coronals undergo assimilation, so do coronals.
  - ii. If coronals trigger assimilation, so do non-coronals.
- (b) Labial–velar asymmetry
  If labials trigger assimilation, so do velars.
- (c) Stop asymmetry
  - i. Non-stops do not undergo (the whole range of) assimilation.
  - ii. If non-stops trigger assimilation, so do stops.
- (d) Sonorant asymmetry
  - i. If non-sonorants undergo assimilation, so do sonorants.
  - ii. If sonorants trigger assimilation, so do non-sonorants.

In contrast to the asymmetries of voicing assimilation, a voiced plosive is devoiced to the left of a voiceless consonant within the phonological word irrespective of the strength of the potential trigger vis-à-vis the potential undergoer.

(59)	/*wagt*/	*wa*[*k*]*t*	'time'
	/*bugših*/	*bu*[*k*]*ših*	'Riyal (unit of currency)'
	/*ragad + t*/	*raga*[*t*]*t*	'I/you m.s. slept'
	/*yudxul*/	*yu*[*t*]*xul*	'he enters'
	/*katab + t*/	*kata*[*p*]*t*	'I/you m.s. wrote'
	/*katab + hā*/	*kata*[*p*]*hā*	'he wrote it f.'

Similarly, when a voiced affricate or fricative precedes a voiceless consonant within the phonological word, devoicing takes place irrespective of the dominance of the potential trigger vis-à-vis the potential undergoer.

(60)	/*xarajt*/	*xara*[*tš*]*t*	'I/you m.s. went out'
	/*nixbiẓhin*/	*nixbi*[*s*]*hin*	'we bake them f.'
	/*taḏkirih*/	*ta*[*ṯ*]*kirih*	'ticket'
	/*aġsil*/	*a*[*x*]*sil*	'I wash'

A voiced obstruent is also devoiced in word- or clitic-final position before a word-initial voiceless consonant.

(61)	/*zid fiᶜil*/	*zi*[*t*] *fiᶜil*	'he also did'
	/*bāb kabīr*/	*bā*[*p*] *kabīr*	'a nice market'
	/*sūg ṭawīl*/	*sū*[*k*] *ṭawīl*	'a long market'
	/*sūg ḥālī*/	*sū*[*k*] *ḥālī*	'a nice market'
	/*ḥawḏ̣ kabīr*/	*ḥaw*[*ṯ̣*] *kabīr*	'a large trough'

By contrast, anticipatory voicing of a domain-final voiceless obstruent is not attested in this dialect. Thus, /k/ is not voiced in *ᶜādū ḏak jālis* 'he's still there', nor is /t/ voiced in *samsarat bašīr* 'Bashir's caravanserai'.

Devoicing of a voiced obstruent in syllable-coda position does not only apply before a voiceless consonant. Devoicing also occurs occasionally in the stressed syllable of a phonological phrase when the undergoer is followed by a sonorant or voiced obstruent. The relatively few instances of obstruent devoicing to the left of a voiced consonant can be taken as further evidence that devoicing is a different type of process from anticipatory voicing and has a different motivation. Examples of unprovoked devoicing include:

(62) */ajmal/* *a*[*tš*]*mal* 'more beautiful'
/yid̠bil/ *yi*[*t̠*]*bil* 'he spits out'

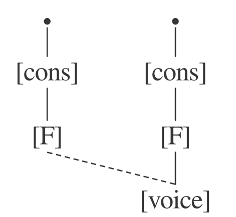
Devoicing of word-final voiced obstruents and sonorant stops also occurs in both dialects in utterance-final position (Jastrow 1984; Behnstedt 1985; Watson 1993*b*; Naïm-Sanbar 1994 and others for San'ani; Woidich 1999: 34 for Cairene). In Cairene, utterance-final devoicing of plosives is usually accompanied by aspiration; in San'ani, utterance-final devoicing is accompanied by pre-glottalization when the final syllable receives main stress in the phonological phrase and plosives may be released as ejectives.[15] Examples include:

(63) (a)	CA	*/katab/*	*kata*[p^h]	'he wrote'
		/balad/	*bala*[t^h]	'country'
		/nadaġ/	*nada*[*x*]	'he chewed'
		/ism/	*is*[*m̥*]	'name'
		/ʔifl/	*ʔif*[*l̥*]	'lock'
		/ʔabr/	*ʔap*[*r̥*]	'grave'
(b)	SA	*/kitāb/*	*kitā*[*ʔp*]	'book'
		/bilād/	*bilā*[*ʔt*]	'village, home town'
		/ṣāj/	*ṣā*[*ʔtš*]	'frying pan'
		/dagīg/	*dagī*[*ʔk*]	'[white] flour'
		/kabīr/	*kabī*[*ʔr̥*]	'big, old'
		/samn/	*sam*[*ʔn̥*]	'clarified butter, ghee'
		/^{c}iyyāl/	^{c}*iyyā*[*ʔl̥*]	'boys, children'

I assume that anticipatory voicing in San'ani results from the spread of [voice] from a voiced obstruent to an obstruent which is not specified for [voice]. As we saw above, and in contrast to Cairene, fricatives only assimilate [voice] from a following fricative, and, except in fast, casual speech, stops only assimilate [voice] from a following stop. Anticipatory voicing in San'ani is represented notationally as right-to-left spread of [voice] to an obstruent undergoer which shares the presence or absence of [cont] (represented here as [F]) with the trigger.

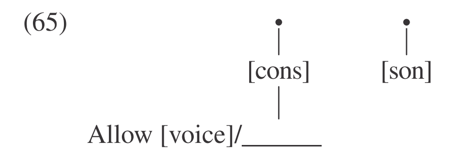
[15] Pre-glottalization is never attested before a final laryngeal or pharyngeal. I presume this to be due to the OCP: insertion of a glottal stop to the left of a primary [guttural] violates the OCP on the [guttural] tier; in the unmarked case, a process will fail to take place if the output would violate the OCP.

(64) Right-to-left spread of [voice]



In contrast to Cairene, the voiced pharyngeal fails to devoice before a voiceless consonant or otherwise in syllable-coda position; hence devoicing in San'ani is attributed to the licensing of [voice] in obstruents, as opposed to non-sonorants, if and only if followed by a sonorant (cf. condition (49)). Licensing is expressed as the 'positive' condition in (65).

(65)



When an underlyingly voiced obstruent is not followed by a tauto- or heterosyllabic sonorant, [voice] is delinked. The effect of this condition may be overridden by spread of [voice] from a following obstruent when trigger and undergoer share the presence or absence of [cont].

Let us now return to geminate devoicing. I have just claimed that delinking of [voice] in response to (65) holds in case the phonological environment for voice assimilation is absent. I have also said that geminate devoicing occurs partly in response to the condition in (65). These two statements are in conflict, since the presence of the voiced second element of the geminate should override the effects of condition (65). However, in (62) we also saw that devoicing may occur in San'ani in the stressed syllable of an intonation phrase when the undergoer is followed by a voiced consonant. Thus, an underlyingly voiced obstruent may remain devoiced even when the phonological environment for voice assimilation is present. We also saw that anticipatory voicing is far less automatic a process in San'ani than it is in Cairene, depending both on the relative dominance of the trigger vis-à-vis the undergoer, and on the casualness of speech. At the beginning of this section, I also suggested that condition (65) may be one of three factors involved in geminate devoicing. The other two factors are the coordinates of segment strength, and Geminate Integrity.

Mohanan identifies four coordinates of segment strength (Mohanan 1993: 103) —see (66).

(66) Increase in segment strength corresponds to:
 (a) Duration: increase in duration
 (b) Voicing: voicelessness
 (c) Sonority: decrease in sonority
 (d) Oral configuration: deviation from the position of the neutral vowel

An examination of my San'ani data reveals an asymmetry regarding the frequency and degree of geminate devoicing: devoicing of velar /gg/ is more common, and far more complete a process, than devoicing of the palatoalveolar affricate /jj/, labial /bb/, or alveolar /dd/. While devoicing of /dd/ often fails to take place, particularly in casual, non-emphatic speech, devoicing of /gg/ is almost exceptionless and often results in a slightly ejective realization. This is particularly the case when the left leg of the geminate falls in the stressed syllable of the phonological phrase. Thus, the frequency and degree of devoicing is proportional to the strength of the undergoer. This is summed up in (67).

(67) *Geminate devoicing in San'ani*
 (a) Only geminates, and hence long segments, are devoiced;
 (b) only stops are devoiced;
 (c) only non-sonorants are devoiced;
 (d) the greater the deviation from the position of the neutral vowel, the greater the degree of devoicing and the more likely it is that devoicing will take place.

Given that one increase in segment strength corresponds to voicelessness, geminate devoicing can be seen as a process which enhances the strength of segments which are already strong by virtue of their length. Thus, geminate devoicing serves to increase the perceived difference between short and long segments in the set of non-continuant obstruents.

Part of the motivation for geminate devoicing appears to be the licensing of [voice] in obstruents when followed by a sonorant, and not elsewhere. However, geminate devoicing involves both the left and the right leg of the geminate, and the right-leg of the geminate is followed by a sonorant (a vowel). According to the principle of Geminate Integrity, if one half of a geminate undergoes a rule, the other half of the geminate undergoes the same rule. If the right leg of the geminate cannot undergo the rule, then the rule will not take place (Kenstowicz and Pyle 1973; Schein and Steriade 1986).

Evidence for the second part of this statement is observed in Persian and in Cairene. Persian has a rule changing a syllable-coda /v/ > [w], described by Hayes (1986: 332–3) as *v*-Weakening. Where geminates are involved, however, the /v/ > [w] rule fails to take place because [w] is barred from syllable-onset position: /v/ in *nov* is realized as [v] in the syllable onset in *nov-i:n* 'new', but as [w] in coda position in *now-ru:z* 'New Year'. The left leg of geminate /vv/ in *ævvæl* 'first' or *qolovv* 'exaggeration' does not change to [w], however, because the right leg of the geminate is in syllable-onset position (Kenstowicz 1994: 412–13). Historically in Cairene, the diphthongs **aw* and **ay* coalesced in pre-consonantal position to

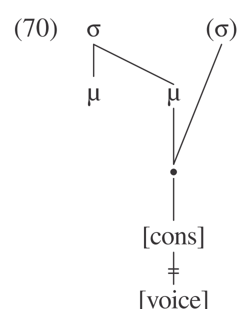
be reanalysed as /ō/ and /ē/ respectively. Thus, the original forms **bayn* 'between' and **bawl* 'urine' came to be realized as *bēn* and *bōl*. Where the glide formed the left-leg of a geminate, however, coalescence failed to take place because the right-leg of the geminate did not satisfy the structural description of the rule by virtue of occupying the syllable-onset. As a result, diphthongs were maintained in forms such as *ʔawwal* 'first' and *miʔayyaḥ* 'septic'. These observations suggest the general constraint on rule application in (68) (adapted by Kenstowicz 1994: 413 from Hayes 1986 and Schein and Steriade 1986).

(68) In order to change the feature content of a segment [A], every skeletal slot linked to [A] must satisfy the rule.

[Voice] in obstruents is licensed in syllable-onset position, and San'ani prefers voiced obstruents in the syllable-onset (see Section 9.2.7); however, this is a weak preference, and does not bar voiceless obstruents in this position. The preference for syllable-initial voiced obstruents motivates voicing of underlyingly voiceless obstruents only in case the obstruent occurs in phonological-word-initial position or intervocalically, and is more likely to apply to coronals than to non-coronals. In all other cases, underlyingly voiceless obstruents are realized without voice in syllable-onset position. Examples of syllable-onset voiceless obstruents include:

(69)
(69)	*yidalhi**f**ū*	'they m. push'
	***s**ā^{c}ah*	'an hour'
	***ṣ**a^{c}duh*	'Sa'da [place name]'
	*ʔā**ṯ**ār*	'remains'
	*kaw**k**abān*	'Kawkaban [place name]'
	*ij**t**ama^{c}ū*	'they m. gathered together'

The rule of geminate devoicing overrides the preference for voiced obstruents in the syllable-onset due to the weakness of the preference in relation to the motivations for geminate devoicing—namely, licensing of [voice] in obstruents to the left of a sonorant and in no other position (65), the requirement to enhance strong segments, and the requirement to enhance the distinction between simplex and geminate non-continuant obstruents. Geminate devoicing is diagrammed as the delinking of [voice] from a moraic non-continuant which is potentially linked to two syllable positions.

(70)


Condition: undergoer is not [continuant]

9.2.7 *Intervocalic voicing (in SA)*

The processes considered so far involve a consonant trigger and a consonant undergoer. Intervocalic voicing, palatalization and labialization, which I consider in this and the following two sections, are processes which involve a vocoid trigger and a consonant undergoer.

Just as strong segments have a tendency to increase in strength, so weak segments have a tendency to decrease in strength. In a large number of languages, stops lenite intervocalically. Across languages, intervocalic lenition involves degemination (as in Malayalam, Mohanan 1993: 101), voicing of voiceless plosives (as in Malayalam and Welsh, Mohanan 1993: 101, 102), frication of voiceless stops (as in Finnish, Mohanan 1993: 102; Tiberian Hebrew, Kenstowicz 1994: 35), frication of voiced stops (as in Welsh, Mohanan 1993: 102; Spanish, Kenstowicz 1994: 35; and Hadrami Arabic, Al-Saqqaf 1999), and may ultimately result in the complete disappearance of the consonant, as in some dialects of Spanish. A decrease in segment strength corresponds to the following (cf. (66)):

(71) Decrease in segment strength corresponds to:
- (a) Duration: decrease in duration
- (b) Voicing: voicedness
- (c) Sonority: increase in sonority
- (d) Oral configuration: closeness to the position of the neutral vowel

In San'ani, consonant lenition is a relatively conservative process and involves voicing of intervocalic and word-initial voiceless simplex consonants in casual speech.[16] In the case of the laryngeal and pharyngeal voiceless fricatives, intervocalic voicing is accompanied by a certain reduction in the degree of frication. When the lenited consonant is a plosive, consonant lenition becomes the mirror image of devoicing of geminate plosives: in geminate devoicing, the strength of the strong (long) segment is enhanced by devoicing; in intervocalic and word-initial voicing, the weakness of the weak (short) segment is enhanced by voicing. Since both intervocalic voicing and geminate devoicing most commonly affect non-sonorant stops, the combined effect of the lenition and fortition processes is to enhance the distinction between long and short non-sonorant stops.

Intervocalic and word-initial voicing in San'ani is an optional and gradient phenomenon: among oral consonants, it affects coronal plosives more frequently and to a considerably greater degree than velar plosives. Hence the weaker the underlying phoneme, the more likely further weakening will take place through voicing. Furthermore, if a consonant is voiced word-initially, we can predict that it will be voiced intervocalically, since the weaker position is intervocalic. Voicing is also

[16] Lenition of word-initial and intervocalic coronal plosives in San'ani was first observed by Jastrow (1984). Jastrow assumed that the emphatic coronal plosive was regularly voiced in intervocalic and word-initial position, and that the non-emphatic /t/ began to be voiced on analogy with /ṭ/. My larger data base shows consonant lenition is not restricted to coronals. It also includes laryngeal and pharyngeal voiceless fricatives, and, in the appropriate phonological environment, the velar stop /k/ and the interdental fricative /ṯ/.

more apparent in fast, casual speech than in slow, careful speech. Where voicing targets velar /k/, the interdental fricative /ṯ/ or the sibilant /s/, it does so intervocalically, and at the beginning of an unstressed syllable. Voicing of the weaker coronal plosives /ṭ/ and /t/, on the other hand, occurs at the beginning of a stressed or an unstressed syllable. Voicing of the laryngeal and pharyngeal fricatives is restricted to intervocalic position. In (72a) are examples of word-initial voicing, in (72b) of intervocalic voicing.

(72)	(a)	*/ṭawīl/*	[*ḍ*]*awīl*	'tall'
		/tiftaḥ/	[*d*]*iftaḥ*	'you m.s. open'
		/turāb/	[*d*]*urāb*	'dust, dirt'
	(b)	*/manāṭig/*	*manā*[*ḍ*]*ug*	'areas'
		/ḥaṭab/	*ḥa*[*ḍ*]*ab*	'wood'
		/fataḥū/	*fa*[*d*]*aḥū*	'they m. opened'
		/dakākīn/	*dakā*[*g*]*īn*	'shops'
		/šarikih/	*šari*[*g*]*ih*	'company'
		/maṯal/	*ma*[*ḏ*]*al*	'proverb'

In at least one case, the result of intervocalic voicing has been reanalysed as a lexicalized form: San'ani speakers claim that the word *matkāʔ* 'arm-rest' has a medial /t/, but that its plural *ma*[*d*]*ākī* 'arm-rests' has a medial /d/. By contrast, a word such as *fataḥ* 'he opened', which is realized as *fa*[*d*]*aḥ*, is invariably analysed by speakers as */fataḥ/* with medial /t/ and not as **/fadaḥ/*.

Intervocalic and word-initial voicing is analysed as an assimilation process whereby the syllable-onset consonant assimilates [voice] from the adjacent vowel, as in (73).

(73) *f a t a ḥ*

```
(73)  f  a  t  a  ḥ
            •  •
             ⋱ |
             [voice]
```

The stronger the obstruent, the more likely it is to resist assimilation of [voice] from the following vowel; hence obstruents which form the second part of a consonant cluster fail to assimilate [voice]. Geminates fail to assimilate [voice] from a following vowel, because the left-leg of the geminate does not satisfy the structural description of the rule, as required by (68). In the case of word-initial obstruents, voicing fails to apply if the word is preceded by a word-final voiceless obstruent within the phonological phrase.

9.2.8 *Palatalization*

Palatalization of coronal and, to a lesser degree, dorsal stops occurs in both Cairene (Haeri 1997; Woidich 1999: 38) and San'ani. Cairene coronal palatalization has two distinct outputs: weak palatalization, whereby the palatal feature manifests as a distinct secondary feature while the primary feature remains apical,

as in /t/ > [t^j] and /d/ > [d^j]; and strong palatalization, which involves a switch in the place of articulation of the undergoer from apical to post-alveolar, as in /t/ > [tš] and /d/ > [ʤ].[17] In the case of dorsal undergoers, only weak palatalization is attested. In San'ani, palatalization of coronal and dorsal stops occurs in fast, casual speech and most commonly manifests itself as weak palatalization.

In Cairene, palatalization is triggered by a following /y/, /i/, /i:/, /e:/, or the epenthetic vowel [ɪ] (Haeri 1997: 58).

(74)	*Underlying*	*Palatalized*	*Gloss*
	/nadya/	*na*[d^j]*ya* ~ *na*[*ʤ*]*ya*	'Nadya [female name]'
	/inti/	*in*[t^j]*i* ~ *in*[*tš*]*i*	'you f.s.'
	/gidīd/	*gi*[d^j]*īd* ~ *gi*[*ʤ*]*īd*	'new'
	/tiktib/	*tik*[t^j]*ib* ~ *tik*[*tš*]*ib*	'she writes'
	/sanatēn/	*sana*[t^j]*ēn* ~ *sana*[*tš*]*ēn*[18]	'two years'
	/bint lēla/	*bin*[t^j]*i lēla* ~ *bin*[*tš*]*i lēla*	'Layla's daughter'

Palatalization is most likely to be triggered by a palatal glide and least likely to be triggered by a long mid-vowel /e:/. Word-final /i/ is more likely to trigger palatalization than /i:/ (which never occurs word-finally) or medial /i/. This discrepancy can be attributed to the height of the trigger segment: the higher the palatal trigger, the greater its palatality and hence the more likely palatalization of adjacent segments will occur. Word-final /i/ in *bi-yibtidi* 'he begins' is higher than the medial /i/ after /t/. Thus, /d/ in this case is more likely to be palatalized than /t/. Haeri ascribes the discrepancy between the palatalizing effect of word-final /i/ and /i:/ to an observation by Bhat (1974) that *unstressed* high vowels are more likely to trigger palatalization than stressed high vowels. In Cairene, /i:/ is always stressed—unstressed long vowels are subject to shortening—whereas, with the single exception of the feminine demonstrative *di* 'this' (Broselow 1976; Haeri 1992: 174, 1997: 60), word-final vowels are never stressed.

Palatalization in San'ani is far less apparent than in Cairene. Coronal palatalization occurs only when triggered by a following palatal glide /y/, and usually manifests itself as weak palatalization, see (75a); palatalization of dorsal stops is most commonly triggered by a following palatal glide, but may also be triggered by a tautosyllabic long palatal vowel /i:/, see (75b). As in Cairene, dorsal palatalization only ever results in weak palatalization:

(75)				
	(a)	*/adyān/*	*a*[d^j]*yān* ~ *a*[*ʤ*]*yān*	'religions'
		/anyāb/	*a*[n^j]*yāb*	'canine teeth'
	(b)	*/akyās/*	*a*[k^j]*yās*	'bags'
		/kīlū/	[k^j]*īlū*	'kilo'
		/hāḏīk/	*hāḏī*[k^j]	'that f.'

[17] Recent sociolinguistic work on Cairene shows strong coronal palatalization to be a feature of younger women's speech (Haeri 1997; Woidich 1999: 38).

[18] The probability of strong palatalization in these latter two environments is very small (cf. below, Haeri 1997: 65).

In San'ani, /k/ is only palatalized by a preceding /i:/ when the undergoer is tautosyllabic with the trigger. Where /k/ is syllabified as the onset of a following syllable, as in *hāḏīk al-bint* 'that f. girl', palatalization fails to occur.

Although the probability of palatalization is greater within the phonological word, palatalization also occurs across word boundaries within the phonological phrase. In Cairene, palatalization across word boundaries occurs most frequently when triggered by a palatal glide (Haeri 1997: 51, 61); in San'ani, palatalization across word boundaries may only be triggered by a palatal glide. In fast speech, palatalization of /t/ across a word boundary in San'ani often results in a palatoalveolar affricate, whereas palatalization of /d/ almost invariably results in a weakly palatalized apical stop.

(76)	(a)	CA	*/nāmit ya^{c}ni/*	*nāmi*[tš] *ya^{c}ni*	'she went to sleep, I mean'
			/il-walad yiʔullik/	*il-wala*[ʤ] *yiʔullik*	'the boy tells you f.s.'
			/yuḥuṭṭ iš-šanṭa/	*yuḥu*[t:š] *iš-šanṭa*	'he puts the bag'
	(b)	SA	*/al-mugawwit yisīr/*	*al-mugawwi*[tš] *yisīr*	'the gat-seller goes'
			/^{c}ād yištarī/	*^{c}ā*[d^{j}] *yištarī*	'he will still buy'
			/lā ḥadd yištī/	*lā ḥa*[d^{j}:] *yištī*	'if someone wants'

Palatalization is dependent not only on the trigger, but also on the potential undergoer. In both dialects, voiceless /t/ has a higher probability of strong palatalization than its voiced counterpart /d/: Haeri's figures (1997: 64) show a .58 probability of strong palatalization for /t/ compared with .43 for /d/. In Cairene, geminate /tt/ is a third less likely to undergo palatalization than non-geminate /t/ (Haeri 1992: 170, 1997: 54); in San'ani, the only examples of geminate palatalization I came across involve /dd/ in the pronoun *ḥadd*. The relative failure of geminates to undergo palatalization can be attributed to the strength of the long segment by virtue of its length and accompanying tenseness (cf. Mohanan 1993: 105), since the stronger the segment the more likely it is to resist assimilation (see Section 8.2). In Cairene, plain /t/ has a higher probability of palatalization than emphatic /ṭ/, and plain /d/ a higher palatalization probability than emphatic /ḍ/.[19] In San'ani, palatalization of /ṭ/ is virtually unattested. The probability differences between plain and emphatic coronals are due to the incompatibility of pharyngeal expansion characteristic of palatalization (see Section 3.4.4) with the pharyngeal constriction characteristic of pharyngealization (see Section 3.4.7).[20]

9.2.8.1 *The palatalizing feature*

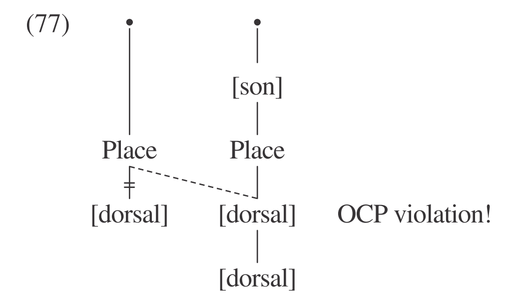
The palatalizing feature in the model adopted here is non-primary [dorsal], where non-primary [dorsal] is interpreted in the default case as dorsum raising and

[19] Although Haeri does not explicitly mention /n/, the nasal coronal is also subject to palatalization (Al-Saqqaf 1999: 95).

[20] According to Haeri's figures, /ṭ/ has a higher palatalization probability than /d/. Haeri attributes this to variability in the degree of pharyngealization, particularly before /i/ (Haeri 1992: 175–6). Palatalization of /ṭ/ is often accompanied by de-emphasization (see Section 10.4.3). It therefore appears that

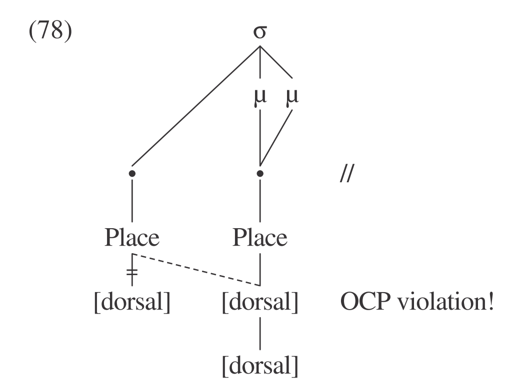
pharyngeal expansion (see Section 3.4.4). Palatalization is a process which applies late in the derivation—after the default assignment of non-primary [dorsal] to a bare primary [dorsal] vocoid (see Section 3.4.4)—and involves the spread of non-primary [dorsal] from a vocoid trigger to a stop undergoer. The undergoer of palatalization either shares a primary [dorsal] node with the trigger, or is a primary [coronal] stop—the most likely segment to undergo place assimilation according to both the dominance scale (55) and the asymmetries in place assimilation table (58). I assume that dorsal palatalization is motivated by an OCP violation on the [dorsal] tier[21] which is resolved by delinking of the leftmost place features. The resulting vacuum is filled by right-to-left spread of the remaining place features:

(77)



Dorsal palatalization triggered by the weaker trigger /i:/ in San'ani occurs only where trigger and undergoer are tautosyllabic, expressed as the mirror-image process in (78).

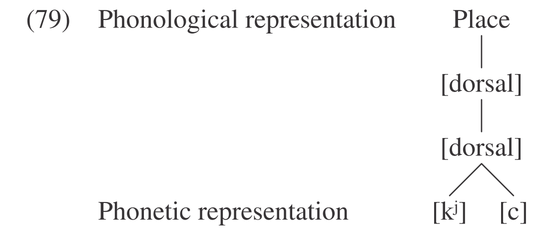
(78)



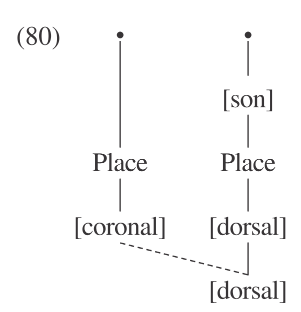
the pharyngeal expansion of palatalization may override the pharyngeal constriction of pharyngealization in certain environments.

[21] The constraint on adjacent dorsals is weaker than that on either adjacent gutturals, which is absolute, or that on adjacent coronals, which depends on the identity of root and stricture features. The constraint on adjacent dorsals, weaker in Cairene than in San'ani, results in leftmost matrix deletion if and only if one of the adjacent dorsals lacks a non-primary feature. In Cairene, leftmost matrix deletion does not take place in the context of non-primary [labial] unless adjacents share the root feature [sonorant] (see Section 9.2.10).

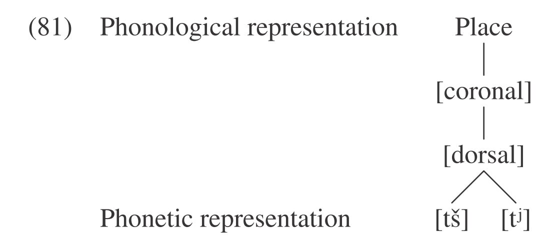
In the present model, there is no representational difference between a palatalized velar and a palatal stop: both involve primary and non-primary [dorsal]. The difference in phonetic interpretation is language specific, and within certain languages may be speaker specific. In Cairene and San'ani, a non-continuant primary [dorsal], non-primary [dorsal] is interpreted as a velar with secondary palatalization. In other languages, the same phonological configuration may be interpreted as a palatal stop (Watson 1999*b*; Watson and Dickins 1999). The phonetic ambiguity of a single phonological representation either cross-linguistically or within a single language is accommodated within the abstract reductionist approach of the theory (Selkirk 1993: 74–5). The representation in (79) illustrates this state of affairs.

(79)


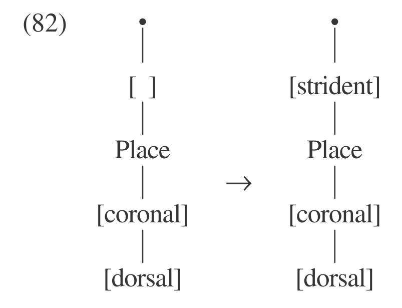
Coronal palatalization is represented as spread of non-primary [dorsal] from a [dorsal] vocoid to a [coronal] stop:

(80)


Spread of non-primary [dorsal] is interpreted in the [coronal] undergoer either as the addition of a secondary palatal articulation to a consonant whose main articulation remains unaltered, or as modification of the primary articulation itself to palatoalveolar. In representational terms, there is no difference between a weakly palatalized apical and a strongly palatalized coronal resulting in a palatoalveolar affricate. Both are represented by primary [coronal] and non-primary [dorsal]. Here we see the phonetic ambiguity of a phonological representation within a single language: in Cairene, the phonetic interpretation of primary [coronal] and non-primary [dorsal] appears to be speaker-specific; in San'ani, phonetic interpretation depends on speed of delivery.



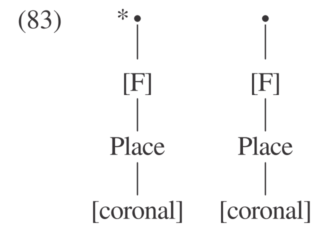
Palatalization processes may involve any or all of pharyngeal expansion, dorsum raising, and spirantization (Bhat 1974). Cairene coronal palatalization involves all three features (Haeri 1997: 46); spirantization is weak in weak palatalization and strong in strong palatalization. I assume the output of coronal palatalization is assigned [strident] by default, as in (82).



The affricate output of coronal palatalization is distinguished from the palatoalveolar fricative /š/ by the presence of [cont] in the matrix of /š/ and lack of [cont] in the matrix of [ʤ]/[tš].

9.2.8.2 *Dissimilation in palatalization*

In Cairene, palatalization is considerably less likely to occur when the potential undergoer is followed by a sibilant in the same word (Haeri 1992: 172, 1997: 53). In a form such as *ḥadīs* 'conversation, modern, tradition of the Prophet' or a verb negated by *-š* such as *ma ruḥtīš* 'I/you m.s. didn't go', palatalization of the coronal stop occurs very rarely. The failure of palatalization in this phonological environment is due to dissimilation. Recall that where the morphology concatenates adjacent sibilants or coronal sonorants in Cairene, the leftmost sibilant/sonorant assimilates totally to the rightmost (see Sections 9.2.2 and 9.2.3). This observation is expressed as a negative constraint on adjacent coronals which share either [strident] or [sonorant] (represented in (83) as [F]):



The output of palatalization is assigned [strident] by default. Palatalization of a coronal stop in the environment of a sibilant would therefore violate constraint (83), expressed as violation of the OCP on the [coronal] tier when adjacents share [strident]. In the unmarked case, a process which would result in an OCP violation fails to take place. The failure of coronal palatalization can also be attributed to the Elsewhere Condition (54) according to which the more specific constraint disallowing adjacent coronals which share [strident]/[sonorant] overrides the more general process of palatalization.

9.2.9 *Labialization of [labial] and [dorsal] consonants (in SA)*

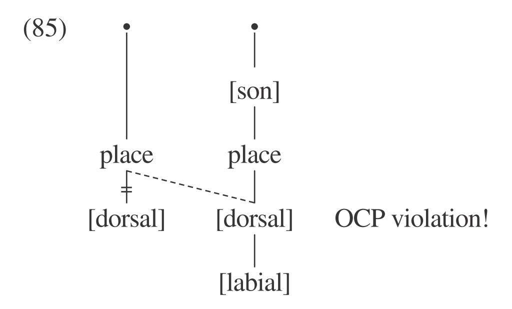
Labialization involves the imposition of lip rounding and/or lip protrusion on a primary articulation. Labialization in San'ani differs from palatalization in that it is more likely to take place in a word which has prominence within the utterance, whereas palatalization takes place irrespective of the prominence of the word in the utterance.

In San'ani, non-domain-final [dorsal] and [labial] consonants are realized with lip protrusion and lip rounding to the right of a labio-velar vocoid /u/ or /w/. [Dorsal] consonants are also labialized to the left of a labio-velar vowel. [Labial] undergoers involve stronger lip rounding than [dorsal] undergoers, and the degree of lip protrusion and lip rounding is stronger when triggered by a stressed vowel than by an unstressed vowel or a glide. In addition, while the few examples of labialization triggered by /w/ are perserverative, /u/ triggers both perserverative and anticipatory labialization of [dorsal] obstruents. Predictably, stops undergo labialization more readily than continuants—cf. (58c). In contrast to the other assimilation processes considered in this chapter, geminate velars and labials undergo stronger labialization than non-geminates. This is compatible with the observation that labialization is more likely to take place in a word which is prominent within the utterance. (84a) provides examples of labialization triggered by a preceding labio-velar vowel or glide, and (84b) examples of labialization triggered by a following labio-velar vowel.

(84)	(a)	*/ummī/*	*u*[*mm*^{w}]*ī*	'my mother'
		/ḍubbī/	*ḍu*[*bb*^{w}]*ī*	'fly'
		/dukkān/	*du*[*kk*^{w}]*ān*	'shop'
		/šuggih/	*šu*[*gg*^{w}]*ih*	'flat'
		/ṭuffay/	*ṭu*[*ff*^{w}]*ay*	'extinguish f.s.!'
		/duxxān/	*du*[*xx*^{w}]*ān*	'smoke'
		/ukāl/	*u*[*k*^{w}]*āl*	'food'
		/yawmī/	*yaw*[*m*^{w}]*ī*	'daily'
	(b)	*/malgūṣ/*	*mal*[*g*^{w}]*ūṣ*	'stung'
		/kull/	[*k*^{w}]*ull*	'all'
		/yurgud/	*yur*[*g*^{w}]*ud*	'he sleeps'
		/gult/	[*g*^{w}]*ult*	'I/you m.s. said'

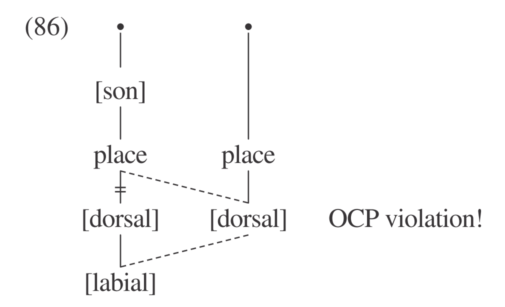
Labialization of [dorsal] obstruents occurs irrespective of whether the trigger lies to the left or the right of the undergoer, whereas labialization of [labial] consonants occurs only when the undergoer lies to the right of the trigger. I attribute this asymmetry to the involvement of two separate processes: leftmost place feature deletion and right-to-left spread of the remaining place features where [dorsal] undergoers are involved, and left-to-right spread of non-primary [labial] where [labial] undergoers are involved. [Dorsal] undergoers share a primary [dorsal] place with the trigger, violating the OCP on the [dorsal] tier (cf. Section 9.2.8). To resolve the OCP violation, the leftmost place features are deleted below the place node and the rightmost place features spread leftwards to associate with the empty place.

(85)



When the labio-velar vocoid occurs to the left of the [dorsal] obstruent, non-primary [labial] reassociates rightwards on deletion of the leftmost place features, as for the reassociation of non-primary place features in coronal (see Section 9.2.4) and guttural (see Section 9.2.5) place assimilation, as in (86).

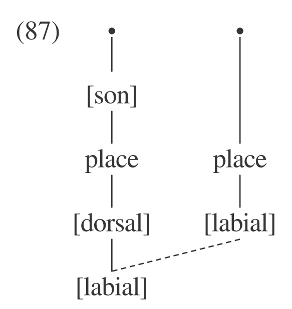
(86)



In the case of [labial] undergoers, non-primary [labial] spreads rightwards from the trigger to a consonant with a [labial] primary place. Many languages, including such diverse ones as Amharic, Wantoat, and Guaraní (Ladefoged and Maddieson 1996: 356), restrict labialization to back consonants. Other languages have a wider range of consonants that are either phonologically or phonetically labialized. In San'ani, the only labialized consonants attested are velars and labials. While the anticipatory and perserverative labialization of [dorsal] undergoers is motivated by a violation of the OCP on the [dorsal] tier, the rightward spread of non-primary [labial] targets consonants with a [labial] primary place—the only primary place

other than [dorsal] in the dialect which is compatible with non-primary [labial]. Rightward spread of non-primary [labial] is represented in (87).

(87)



9.2.10 *Labialization of [dorsal] vowels*

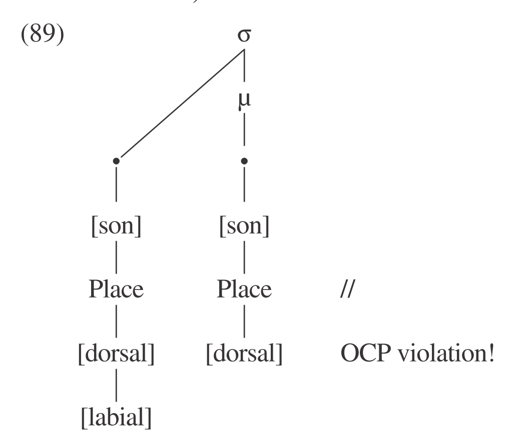
The processes considered above involve a consonant undergoer assimilating (a portion of) the matrix of an adjacent consonant or vowel trigger. This section deals with a process attested in both dialects through which a syllabic undergoer assimilates the matrix of a non-syllabic trigger, namely the realization of monomoraic /i/ as [u] in the environment of the labio-velar glide /w/. In Cairene, the vowel undergoer lies to the right of the trigger, as in: *wi* > *wu* 'and', *wiṣṭ* > *wuṣṭ* 'middle' (Woidich 1999: 38). In San'ani, the process targets non-final [dorsal] vowels which are tautosyllabic with the labio-velar trigger—that is, when the trigger is either in the onset or the coda of the syllable in which the undergoer lies. Examples from San'ani include the following:

(88)	*yidawwur*	'he looks for'	cf. *yidarris*	'he teaches'
	ġudwuh	'tomorrow'	cf. *badlih*	'suit'
	wugif	'he stopped'	cf. *nišif*	'it m. dried up'
	wulād	'birth [party]'	cf. *bilād*	'country, village'
	wullād	'assisting in birth'	cf. *gillād*	'imitating'
	buwwān	'becoming rich'	cf. *xizzān*	'chewing, storing'
	yuwgaf	'he stops'	cf. *yilḥag*	'he catches up'

In contrast to the majority of assimilation processes discussed above, /i/ > [u] is triggered specifically by the labio-velar glide /w/, and not by a set of segments. The failure of bimoraic [dorsal] vowels to labialize in the environment of a labio-velar glide is due to the strength of the potential undergoer by virtue of its length, and the assignment of non-primary [dorsal] to doubly-linked [dorsal] vowels at an early stage in the derivation (see Section 3.4.4): the constraint on adjacent dorsals only results in deletion of the leftmost matrix when one of the adjacents lacks a non-primary feature (n. 21). The juxtaposition of /w/ and /i/ constitutes a violation of the OCP on the [dorsal] tier (cf. Sections 9.2.8 and 9.2.9) when adjacents share [sonorant]. Thus, the restriction on adjacent [dorsal] sonorants is similar to the restriction on adjacent [coronal] sonorants discussed in Section 9.2.2, but differs insofar as the [dorsal] sonorant restriction is limited to the domain of the syllable.

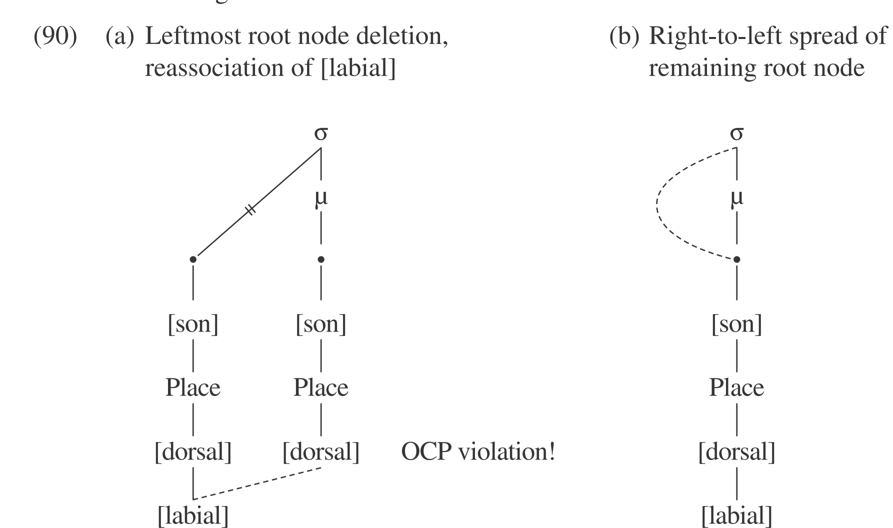
For San'ani, this is expressed as the mirror-image process in (89); for Cairene, the trigger lies to the left of the undergoer (where *w* lies to the right of *i*, *w* will be linked to a mora).

(89)



As in the case of adjacent [coronal] sonorants (see Section 9.2.2), the leftmost root node is deleted. When the labio-velar lies to the left of the vowel, [labial] reassociates with the remaining matrix before leftward spread of the rightmost root node to fill the resulting vacuum.

(90) (a) Leftmost root node deletion, reassociation of [labial] (b) Right-to-left spread of remaining root node



9.3 CONCLUSION

In this chapter, I have dealt with the major prosodic and melodic post-lexical processes in Cairene and San'ani. Prosodic processes were shown to be at least partially in response to the requirements of the Prosodic Hierarchy. The local melodic

processes discussed were viewed in terms of consonant-to-consonant, vowel-to-consonant and consonant-to-vowel effects. The asymmetry of voicing assimilation is shown to be due to the interaction of two conflicting processes. After Lombardi (1991, 1995, 1996), apparent anticipatory devoicing is attributed to the licensing of [voice] in obstruents in San'ani, and in non-sonorants in Cairene, to the left of a sonorant. [Voice] is delinked from an obstruent in all other environments. Delinking of [voice] may be overridden, however, by right-to-left spread of [voice] from an adjacent voiced obstruent. In San'ani, anticipatory voicing depends on the trigger and undergoer sharing the presence or absence of [cont] and is dependent, to a far greater extent than Cairene, on both the relative strength of the undergoer, and on the speed and casualness of delivery.

Local melodic processes involving place are due principally to a violation of the OCP on a specific tier, or to spread of a non-primary place feature from the trigger to a compatible primary feature in the undergoer. The restriction on adjacent identical place features, however, is not absolute in all cases, and does not result in the same resolution: the weaker the place feature, the greater the restriction on adjacents; the stronger the place feature, the more likely the occurrence of adjacent identicals. Thus, the restriction on adjacent gutturals is greater than that of adjacent coronals which in turn is greater than that of adjacent dorsals. In both dialects, adjacent gutturals are banned absolutely, resulting in total assimilation through deletion of the leftmost root node and subsequent right-to-left spread of the remaining root node. The restriction on adjacent coronals and dorsals, by contrast, depends on the identity of other features in the matrix. A violation of the OCP on the [dorsal] tier results in leftmost place feature deletion if and only if one of the adjacents lacks a non-primary place feature, and the restriction on adjacent coronals and dorsals results in deletion of the leftmost root node and spread of the rightmost root node if and only if adjacents share the root feature [sonorant]. In all other cases, a violation of the OCP on either the [coronal] or [dorsal] tiers is resolved by deletion of the leftmost place features and right-to-left spread of place features from the remaining matrix. Within this chapter, we have seen that the restriction on adjacent coronals is greater in Cairene than in San'ani, and the restriction on adjacent dorsals greater in San'ani than in Cairene. Further local and long-distance consonant-to-vowel and consonant-to-consonant effects are examined in the next chapter, which considers spread of pharyngealization in Cairene and pharyngealization and labialization in San'ani.

10

EMPHASIS

The assimilation processes considered in Chapters 8 and 9 involve a consonantal or vocalic undergoer acquiring a portion or the whole of the feature matrix of an adjacent trigger. This chapter deals with the local and long-distance spread of non-primary features from a group of segments referred to broadly as emphatic. The presence of a set of pharyngealized coronals attested in the Central Semitic languages and their effect on consonants and vowels minimally within the syllable and, in general, maximally within the phonological word is one of the most widely recognized features of Arabic phonology. Traditionally, these consonants are referred to as emphatics and are held to be distinguished from a set of plain counterparts by the presence of a feature described loosely as phonological emphasis. In Chapter 3, however, I show that the set of emphatics is not restricted to the pharyngealized coronals. It also includes the uvulars (including the uvular fricatives and the uvular stop in dialects for which these sounds are attested phonologically) and the pharyngeals. These are analysed as the emphatic counterparts of the velars and the laryngeals respectively.

The analysis of all the pharyngeal and pharyngealized phonemes as emphatic is not new, but follows that of Jakobson (1957), Garbell (1958), and McOmber (1996). The analysis also bears similarities with Broselow (1976), for whom the pharyngeal and pharyngealized sounds share the feature [+constricted pharynx], although the pharyngeals are not described as emphatic as such. The phonological analysis is supported by Laufer and Baer's (1988) phonetic study of the oral emphatic and pharyngeal sounds in Hebrew and Arabic, in which they conducted 300 minutes of video recordings from nine Hebrew and Arabic speakers using a fiberscope in the upper pharynx and simultaneous audio recordings. Their analysis of the audio-visual recordings showed that all the emphatic and pharyngeal sounds studied were made with qualitively the same pharyngeal constriction, but that the pharyngeal constriction was more extreme and less variable in the pharyngeals than in the oral emphatics.

In this chapter, I begin by considering the articulatory and acoustic correlates of phonological emphasis. I then consider the phonetic effect of spread on vocalic undergoers from pharyngeals and pharyngealized oral consonants. In Section 10.4, I examine the domain of emphasis in Cairene, the directionality of spread of pharyngealization, and the phenomenon of guttural off-glides in the environment of the pharyngeals. In Section 10.5, I examine emphasis in San'ani, a dialect for which emphasis in the pharyngealized coronals has two phonological exponents—pharyngealization and labialization. In this section, I consider the domain

of emphasis and account for asymmetry in the directionality of spread of pharyngealization, on the one hand, and labialization, on the other.

10.1 THE ARTICULATORY CORRELATES OF EMPHASIS

The Arab grammarians considered emphasis to be a feature inherent in certain oral consonants which rendered them distinct from their plain counterparts. According to the eighth-century Arab grammarian, Sibawayh, emphasis involved raising the tongue dorsum towards *al-ḥanak al-aᶜlā* 'the upper palate' (Sibawayh 1982: 436), a place said to lie between the points of articulation for /k/ and /ḥ/ (Giannini and Pettorino 1982). Western accounts initially described emphasis in the oral emphatics as velarization—the raising of the pharyngeal dorsum towards the soft palate (Nasr 1959*a*; Obrecht 1968). Later work by Al-Ani (1970), Ghazeli (1977), Dolgopolsky (1977), and others (e.g. Broselow 1976; Card 1983; McCarthy 1986, 1994; Jarrah 1993) based on the results of laboratory analysis demonstrates that the soft palate is not involved in the production of emphasis, but rather that the oral emphatics are marked by constriction in the upper pharynx. In recent work, emphasis in the oral emphatics is either described as pharyngealization (due to the presence of general pharyngeal constriction) (Dickins 1990; Watson 1999*d*), or as uvularization (due to upper pharyngeal constriction in the oral emphatics similar to the constriction found in the uvular fricatives) (Dolgopolsky 1977; McCarthy 1994; Shahin 1997, 1998; Zawaydeh 1998).[1] In this model, emphasis is described as pharyngealization and represented by non-primary [guttural] (see Sections 3.4.7–10), a feature which encompasses the degrees of pharyngeal constriction attested in all the emphatic sub-sets.

Although described phonologically as pharyngealization, emphasis does not involve a single articulatory feature; rather, a number of phonetic phenomena combine to create the auditory impression of 'darkening' (Harrell 1957: 69; Lehn 1963: 30–1 for Cairene). In a number of modern Arabic dialects, pharyngealization in the pharyngeals is enhanced by labialization and in the pharyngealized oral consonants by labialization and lateral spreading and concavity of the tongue. Of these, lip-protrusion or lip-rounding is the most obvious and certainly the most visually salient enhancing feature of the emphatic phonemes. It is also not confined to modern dialects of Arabic: in the rendering of religious texts in Standard Arabic, oral emphatic consonants have very pronounced lip-rounding (Holes 1995: 56). In a number of modern Arabic dialects, the non-final perfect and the imperfect stem vowel is realized as either *a* or *u*, but never as *i*, when one of the root consonants is an oral emphatic. This is exemplified in Lebanese *ruxiṣ* 'it m. became cheap'

[1] Laufer and Baer's (1988) analysis of 300 minutes of audio-visual recordings, however, contradicts the uvularization hypothesis of Ghazeli (1977) and others, showing that constriction for both pharyngeals and pharyngealized orals is in the lower pharynx with the narrowest constriction between the epiglottis and the pharyngeal wall.

(Haddad 1983, cited in Kenstowicz 1994: 42) and the Yemeni dialect of Baraddun *yiguṣṣ* 'he cuts' (Bettini 1985: 121). In a few Arabic dialects, including San'ani and Iraqi, labialization is not restricted to the emphatic phoneme or to vowels in verb stems, but spreads throughout the phonological word. In Cairene, as in most other modern Arabic dialects, the slight lip protrusion or lip rounding apparent in the oral emphatics (Lehn and Abboud 1965: 271) is restricted to the emphatic phoneme itself (Harrell 1957: 69–70).

10.2 THE ACOUSTIC CORRELATES OF EMPHASIS

Combined with the primary feature, the articulatory features of emphasis in the oral emphatics enlarge the oral cavity and decrease the volume of the pharyngeal cavity. It is this large, semi-contained oral cavity which endows the emphatic consonant and surrounding sounds with the auditory impression of 'darkness' or 'heaviness'.[2] The oral emphatics are typically marked by a compact acoustic spectrum through lowering of the upper frequency formants (principally F2) due to an enlarged mouth cavity, and raising of F1 due to a reduced pharyngeal cavity. Through lacking a primary constriction within the oral tract, the lowering of F2 is less marked in the pharyngeals (cf. Hoberman 1985: 223).[3]

Recent experimental studies show the most significant acoustic correlate of emphasis in the oral emphatics to be F2 lowering. This suggests that the most significant articulatory correlate of emphasis is enlargement of the oral cavity. As for any cavity, the oral cavity may be enlarged at either extremity of the tract. Likewise, the acoustic effects of enlargement at one end of a tract tend to be enhanced by enlargement at the opposite end (cf. Stevens and Keyser 1989). Enlargement of the tract at the pharynx may be enhanced by enlargement of the tract at the lips through lip protrusion or rounding, just as enlargement of the tract at the lips in labial segments tends to be enhanced by enlargement at the pharynx. Since labialization has the acoustic effect of lowering F1, while pharyngealization has the effect of raising F1, the fact that labialization is an enhancing feature, particularly in the oral emphatics, is further evidence that F2 lowering is more significant than F1 raising in the identification of emphasis.

10.3 [GUTTURAL] SPREAD

In Chapter 3 and above, I argue that the set of emphatics includes both the oral emphatics and the pharyngeals *ḥ* and *ᶜ* and that emphasis is represented by non-

[2] The Arab grammarians typically refer to the pharyngeals and pharyngealized consonants as *mufaxxam* 'intensified' or 'honoured' (Harrell 1957: 80).

[3] According to Laufer and Baer (1988), however, F2 lowering is a significant factor in both the pharyngeals and the pharyngealized oral consonants.

primary [guttural]. However, [guttural] spread from the pharyngeals does not have an identical phonetic effect to [guttural] spread from the oral emphatics; also, while [guttural] spreads long distance from the coronal emphatics and targets both vowels and consonants, [guttural] spread from the pharyngeals is restricted to adjacent vowels.

The difference in realization of [guttural] spread from each of the emphatic subsets is not, however, reason to avoid describing the pharyngeals as the emphatic counterparts of the laryngeals. In this section, I claim that both the domain of spread and the phonetic realization of [guttural] spread is predictable from the combinatorial feature specification of the trigger. I conjecture that the more contingent the phonetic realization of the non-primary feature on the primary feature, the further the non-primary feature will spread and the less specific the targets of spread will be. In palatalization processes, spread of non-primary [dorsal] from a palatal vocoid is local and typically targets [coronal] and [dorsal] plosives specifically, due to the fact that the phonetic realization of non-primary [dorsal] is independent of the other features of the segment. Similarly, non-primary [guttural] in a pharyngeal is not moderated by other place or stricture features of the segment and therefore spread of non-primary [guttural] from a pharyngeal trigger is local, targeting adjacent short vowels, and in Cairene targeting adjacent long [guttural] vowels and the immediately adjacent mora of long [dorsal] vowels optionally.

In the case of the coronal emphatics, on the other hand, the phonetic realization of non-primary [guttural] is highly contingent on the primary [coronal] feature: primary [coronal] adds tension to the tongue dorsum and restricts pharyngeal constriction to the upper pharynx, while non-primary [guttural] serves to retract the tongue blade from the top of the incisors towards the alveolar ridge (Ali and Daniloff 1974; McOmber 1996: 251–2; Zemánek 1996: 4). This feature combination affects both the domain of spread and the realization of emphasis spread. While spread of non-primary [guttural] from a pharyngeal typically results in a lowered realization of adjacent short vowels and long [guttural] vowels, spread from an oral emphatic results in a lowered, centralized realization of [dorsal] vowels and a lowered, retracted realization of [guttural] vowels. This is demonstrated in the following examples from Cairene. Before a syllable-final pharyngeal, /i/ is lowered to [ɛ] (examples in (1)–(5) from Woidich 1999: 27–8).

(1)	*ti^{c}mil*	[tɛ^{c}mɪl]	‘she does, makes’
	ṭili^{c}	[ṭɨlɛ^{c}]	‘he went up’
	iḥna	[ɛḥnɐ]	‘we’

When tautosyllabic with a pharyngeal, /u/ is lowered to [o]:

(2)	*yikuḥḥ*	[yikoḥḥ]	‘he coughs’
	ḥubb	[ḥobb]	‘love’

Adjacent to /q/, and within the same phonological word as a pharyngealized coronal, /i(:)/ is realized as a slightly lowered, centralized vowel [ɨ(:)]—see (3a) and (3b), and /u/ as a slightly lowered, centralized, rounded vowel [ʉ], see (3c).

(3) (a) *ṭifl* [ṭɨfl] ‘child’
ḍill [ḍɨll] ‘shadow, shade’
qidir [qɨdɨr] ‘fate’
(b) *daqīqa* [dɑqɨ:qɑ] ‘minute’
ṣīn [ṣɨ:n] ‘China’
ṭīn [ṭɨ:n] ‘clay, earth’
(c) *šunaṭ* [šʉnɑṭ] ‘bags’
ḍuhr [ḍʉhr] ‘noon’

In non-emphatic environments, /a/ is realized as [ɐ]. Adjacent to the pharyngeals, however, /a/ is realized as [a]—see (4a), and /a:/ is optionally lowered to [a:]—see (4b):

(4) (a) *balaḥ* [bɐlaḥ] ‘dates’
ḥadd [ḥadd] ‘someone’
^{c}amal [^{c}amɐl] ‘he did’
(b) *sā^{c}a* [sɐ:^{c}a] ~ [sa:^{c}a] ‘hour’
wāḥid [wɐ:ḥɛd] ~ [wa:ḥɛd] ‘one’

In the same phonological word as a pharyngealized coronal or in the adjacency of /q/, /a/ is realized as [ɑ] in (5a) and /a:/ as [ɑ:] in (5b):

(5) (a) *qatal* [qɑtɐl] ‘he killed’
ṭalab [ṭɑlɑb] ‘he demanded’
faṣl [fɑṣl] ‘class’
(b) *ṭāb* [ṭɑ:b] ‘he became good’
qām [qɑ:m] ‘he got up’
ballāṣ [bɑllɑ:ṣ] ‘earthenware jar’

X-ray configurations of pharyngealized coronals in the environment of both [guttural] and [dorsal] vowels show that the tongue blade is raised towards the alveolar ridge, the palatine dorsum is depressed and the pharyngeal dorsum is retracted before, during and after the production of the emphatic. These combined phonetic effects result in the lowered and centralized realization of [dorsal] vowels. The lowered, retracted realization of [guttural] vowels in the environment of pharyngealized coronals is also attributable to these phonetic effects: retraction of the pharyngeal dorsum, depression of the palatine dorsum and raising of the tongue blade with slight enhancing labialization increases the volume of the vocal tract and acoustically serves to further lower F2. I conjecture that the similar realization of vowels in the environment of the uvular stop in Cairene is due to the combined phonetic effect of the dorsum raising of primary [dorsal] and the dorsum retraction of non-primary [guttural] together with perceptible enhancing lip protrusion and rounding. The resonance note of the oral and pharyngeal cavities depends not only on the position of the tongue but also on the degree of closure at the jaws and the lips (Delattre 1971: 133). In the case of spread from the pharyngeals, the tongue blade and palatine dorsum play no role in the spread process, hence the degree

of tension in the dorsum is less, and spread of non-primary [guttural] simply lowers the adjacent vowel. Acoustically, vowels in the environment of pharyngeals are realized with less F2 lowering due, partly, to the fact that labialization in the pharyngeals is less apparent than in the oral emphatics.

10.4 THE DOMAIN OF EMPHASIS SPREAD

In both Cairene and San'ani, the extent of emphasis spread is greatest from the pharyngealized coronals and least from the pharyngeals. In these dialects, emphasis spread from the pharyngealized coronals may encompass the whole phonological word, as in (6) and (25), or spread beyond the word boundary, as in (11) and (26), though it may be blocked by non-tautosyllabic [dorsal] vocoids (/y/ or /i/) to the right of the emphatic, and may fail to spread into prefixes and suffixes (Broselow 1976: 46; Woidich 1999: 45 for Cairene). In Cairene, emphasis spread from the uvular /q/ targets adjacent vowels only. In the case of the pharyngeals, emphasis targets adjacent short vowels, optionally targets long [guttural] vowels, and in Cairene optionally targets the adjacent portion of the adjacent mora of long [dorsal] vowels. The difference in the extent of spread from the different sub-classes of pharyngealized consonants I take again to be a direct reflection of the contingency relationship between the primary and non-primary feature—the stronger the relationship between a primary and a non-primary feature, the longer the muscle relaxation time, the longer the dorsum and vocal tract take to return to a neutral position, and hence the further pharyngealization will spread within the word. In the articulation of pharyngealized coronals, both the corona and the dorsum are involved at opposite diagonals of the vocal tract. The tongue is thus stretched in two directions. In the articulation of the uvular stop, the dorsum is retracted towards the uvula. In the articulation of the pharyngeals, the tongue root is retracted to narrow the pharynx on the front–back dimension (Laufer and Baer 1988: 163), but neither the dorsum nor the corona is actively involved. Thus the tongue is in a lesser state of tension than for either the pharyngealized coronals or the uvulars. In this section, I examine the domain of [guttural] spread in Cairene, considering first spread from the pharyngealized coronals, and then spread from the pharyngeals. In Section 10.5, I examine the domain and directionality of emphasis spread in San'ani, considering first the spread of [guttural] and then of [labial] from the pharyngealized coronals.

10.4.1 *Emphasis spread from the primary coronal emphatics in Cairene*

From any of the primary coronal emphatics /ṣ, ṭ, ḍ, ẓ/ in Cairene, [guttural] spreads bidirectionally within the stem of the phonological word. The minimum domain of spread is CV (Broselow 1976: 32) and the maximum domain the entire phonological word. In the following sets of examples, the underlying emphatic is represented by a subscript dot while targets of emphasis are represented by underlining.

(6)	*Rightwards*		*Leftwards*		*Bidirectional*	
	ṣubyān	'boys'	*rabaṭ*	'he bound'	*baṣala*	'onion'
	ṣiyām	'fasting'	*maraḍ*	'illness'	*xaḍḍar*	'to make green'
	ḍarab	'he hit'	*abyaḍ*	'white'	*waḷḷa*	'by God!'

Emphasis spread is optionally blocked by non-tautosyllabic [dorsal] vocoids to the right of the underlying emphatic. Examples include:

(7)	*maṣāyib ~ maṣāyib*	'misfortunes'	cf. *maṣība*	'misfortune'
	ṭayyib ~ ṭayyib	'good'	cf. *ṣiyām*	'fasting'
	ṣāḥib	'my friend m.'	cf. *aṣḥāb*	'friends m.'
	^{c}*aṣafīr*	'small birds'	cf. ^{c}*aṣfūr*	'small bird'
	faḍya	'empty f.s.'		

Emphasis may also be blocked by non-tautosyllabic /u/ in suffixes:

(8) *ṣaḥbu* 'his friend m.' cf. *aṣḥāb* 'friends'

However, emphasis fails to be blocked by a tautosyllabic [dorsal] vowel. The examples above contrast with the following:

(9)	*ṭīn*	'mud'	*ṭifl*	'child'
	taxḍīr	'making green'	*yiṣīḥ*	'he shouts'

In contrast to rightward spread, leftward spread from a primary emphatic fails to be blocked by [dorsal] vocoids within the stem:

(10)	*maḥāfiẓ*	'wallets'	*ʔamīṣ*	'shirt'
	wiṣil	'he arrived'		

The domain of emphasis is also affected by the structure of adjacent words. Where the word preceding a word with an underlying emphatic ends in a stop, this stop and in some cases its preceding vowel may be realized with emphasis, see (11a). In phrases invoking the name of God, emphasis also targets larger groups of segments in the preceding word, as in (11b). Similarly, the leftmost consonant of a following word is emphasized when this sequence is syllabified with the preceding word, see (11c).

(11)	(a)	*liban dakaṛ*	'Frankincense resin'	*walad ṭawīl*	'a tall boy'
	(b)	*in šā ʔaḷḷā*	'God willing'	*ma šā ʔaḷḷā*	'fantastic!'
	(c)	*il-ʔōḍa kbīra*	'the room is large'	*dakatṛa ktīr*	'a lot of doctors'

The *-l* of the definite article, phonologically part of the preceding word (see Section 9.1.2.3), is optionally realized as emphatic together with its preceding vowel when it defines a word with an emphatic coronal:

(12) *il-maraḍ ~ il-maraḍ* 'the illness'

When *-l* of the article assimilates to an emphatic coronal, the assimilated segment

is realized as emphatic irrespective of whether the consonant to which it assimilates is a primary emphatic or emphatic by virtue of emphasis spread:

(13) *iṭ-ṭīn* 'the mud' *iṣ-ṣubḥ* 'the morning'
iṛ-ṛāgil 'the man' *ig-gāṛ* 'the neighbour'

The prefixes *it-*, *in-*, *mi-* and *yi-* usually remain unaffected by emphasis spread as does the {third person feminine singular} subject suffix *-it* and the homophonous allomorph of the nominal {feminine singular} suffix. The example *šanṭiti* 'my bag' shows that {feminine singular} may be unaffected by emphasis spread even when the vowel of the morpheme is tautosyllabic with the underlying emphatic.

(14) *minṣāb* 'hit' *maṭṭarit* 'it rained'
ġuṛbitik 'your f.s. absence' *yitribiṭ* 'it m. is bound/tied up'
šanṭiti 'my bag'

10.4.2 *Emphasis spread from the secondary emphatics*

The secondary emphatics /ṛ, ḷ, ṃ/ and /ḅ/ exhibit a limited number of oppositions with their non-emphatic counterparts. Oppositions include:

(15) *gāṛi* 'my neighbour' *gāri* 'running'
baʔaṛi 'my cows' *baʔari* 'beef adj.'
ṛāgil 'man' *rāgi*^{c} 'returning'
ṛāʔid 'major' *rāʔid* 'lying'
ḅāḅa 'Daddy' *bāba* [Coptic month]
waḷḷa 'by God' *walla* 'or'
ṃayyiti 'my water' *mayyiti* 'my deceased'

In contrast to the four primary emphatics, emphasis spread from the secondary emphatics is usually restricted to consonants and [guttural] vowels within the phonological word. Since /ḅ/, /ḷ/, and /ṃ/ are extremely marginal and exhibit very few minimal contrasts with non-emphatic counterparts, I restrict my statements here to /ṛ/.

Emphasis spread from an /ṛ/ trigger is blocked by a [dorsal] vocoid to the right or left of the emphatic. This is exemplified below:

(16) *Left* *Right*

diṛāsa 'learning' *ṛamya* 'ash'
infigāṛ 'explosion' *ṛumādi* 'grey'
sifāṛa 'embassy' *ṛāgil* 'man'

Where /ṛ/ comes in direct contact with a [dorsal] vocoid, not only is emphasis spread blocked, but the underlying emphatic is itself de-emphasized. The rightmost column in (17a) gives examples with the [dorsal] vocoid to the left, that in (17b) examples of the [dorsal] vocoid to the right of the emphatic:

(17) (a) *sāṛ* 'he went' cf. *sāyir* 'going'
xaddaṛ 'he stupefied' cf. *taxdīr* 'stupefying'
akbaṛ 'older' cf. *kabīr* 'old'
sifāṛa 'embassy' cf. *safīr* 'ambassador'
tōṛ 'bull' cf. *tirān* 'bulls'
(b) *tigāṛa* 'trade' cf. *tigāri* 'trade adj.'
ʔidāṛa 'administration' cf. *ʔidāri* 'administrative'
faʔṛ *'poverty'* *cf.* *faʔri* 'poor adj.'

Where the {first person singular} possessive pronoun *-i* is suffixed, however, /ṛ/ is not de-emphasized. Thus *gāṛi* 'my neighbour' and *baʔaṛi* 'my cows' contrast with *gāri* 'running' and *baʔari* 'beef adj.'. I conjecture that de-emphasization of /ṛ/ is a process which is determined early in the derivation. /i/ in *gāri* 'running' is part of the word stem; /i/ in *baʔari* 'beef' is the relational or *nisba* ending (see Section 7.2); /i/ in *baʔaṛi* 'my cows' is the {first person singular} possessive pronoun suffix. As we have seen in Chapter 7, /i/ of the relational suffix is ordered one in the nominal level-two morphology, whereas the homophonous {first person singular} possessive pronoun suffix is ordered five (see Section 7.2; Table 7.2). I assume that de-emphasization of /ṛ/ takes place prior to affixation of possessive pronoun suffixes. Where de-emphasization fails to take place at this stage, emphatic /ṛ/ survives to the surface. In contrast to de-emphasization of /ṛ/, spread of emphasis from /ṛ/ is determined purely by the phonological environment.

10.4.3 *Analysis*

In Cairene, leftward spread from an underlying primary emphatic is unbounded within the stem, whereas rightward spread may be blocked by [dorsal] vocoids. I assume that in Cairene non-primary [dorsal] is assigned by default to [dorsal] vocoids prior to the spread of emphasis. [Dorsal] vocoids block the spread of emphasis because the pharyngeal expansion characteristic of non-primary [dorsal] (see Section 3.4.4) is incompatible with the pharyngeal constriction of pharyngealization (see Section 3.4.5). This is expressed as the negative constraint in (18).

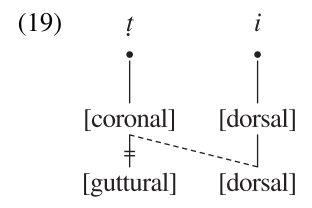
(18) *
•
|
[dorsal]
/ \
[dorsal] [guttural]

This negative constraint usually fails to prevent [guttural] spread under two conditions: firstly in right-to-left spread, and, secondly, where the [dorsal] vocoid is tautosyllabic with the emphatic trigger. This latter is the case for both the pharyngealized orals and the pharyngeals (cf. (1) and (2)). Assimilation processes are more likely to take place in a small domain than in a large domain (see Section 8.2). Thus, emphasis will tend to spread to a [dorsal] vocoid which falls in the

same syllable as the emphatic trigger, but will be blocked by a non-tautosyllabic [dorsal] vocoid. The failure of the constraint to hold in right-to-left spread, on the other hand, is due to an asymmetry in timing between the primary and non-primary articulation where secondary articulations are involved (cf. Ladefoged and Maddieson 1996: 357): in pharyngealization, the pharynx narrows prior to the hold phase of the primary articulation. Pharyngealization is thus anchored more on the onset of the primary articulation, resulting in the typical anticipatory nature of pharyngealization spread. In the unmarked direction of spread, pharyngeal constriction overrides the segmental requirement of pharyngeal expansion in the [dorsal] vocoid. In the marked direction of spread, however, the segmental requirements of the [dorsal] vocoid override the cross-segmental requirement of emphasis spread.

The de-emphasization of /ṛ/ in the immediate environment of a [dorsal] vocoid is due to the pharyngeal expansion of palatalization overriding the pharyngeal constriction of the adjacent secondary emphatic. De-emphasization may also take place when the primary emphatics are involved. In Chapter 9, we saw that a following palatal vocoid may palatalize a pharyngealized coronal stop optionally in Cairene (see Section 9.2.8). Palatalization in this case is often accompanied by de-emphasization, expressed as non-primary [dorsal] overriding non-primary [guttural] of the primary emphatic. Palatalization and de-emphasization of /ṭ/ is diagrammed in (19).

(19)



In marked cases, the [guttural] feature of the emphatic may remain on spread of [dorsal], ensuring that in certain environments the requirements of the segment are not overridden by the cross-segmental spread process.

10.4.4 *Spread from the pharyngeals and the guttural off-glide*

In contrast to [guttural] spread from a pharyngealized coronal, spread from a pharyngeal is restricted to adjacent [guttural] vowels and tautosyllabic short [dorsal] vowels. In each case, spread results in lowering of the vowel. In the case of spread to a palatal vowel, I assume that the spreading [guttural] feature overrides non-primary [dorsal] in the target (cf. above). Examples are repeated for convenience from (1), (2), and (4) above. (20a) provides examples of spread to short [dorsal] vowels, and (20b) examples of spread to short and, optionally, to long [guttural] vowels.

(20)	(a)	*ti*ᶜ*mil*	[tɛᶜmɪl]	'she does, makes'
		iḥna	[ɛḥna]	'we'
		ḥubb	[ḥobb]	'love'

(b)	*balaḥ*	[bɐlaḥ]	'dates'
	^{c}amal	[^{c}amɐl]	'he did'
	sā^{c}a	[sɐ:^{c}a] ~ [sa:^{c}a]	'hour'
	wāḥid	[wɐ:ḥɛd] ~ [wa:ḥɛd]	'one'
	^{c}āzib	[^{c}ɐ:zib] ~ [^{c}a:zib]	'bachelor'

The long [dorsal] vowels /e:/, /o:/, /i:/ and /u:/, by contrast, are not lowered in the immediate environment of the pharyngeals, but are usually accompanied by a regressive (21a) or anticipatory (21b) lowered off-glide (Harrell 1957: 46–8).

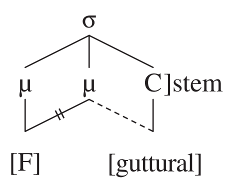
(21)	(a)	*waḥīd*	[waḥ^{a}i:d]	'[name]; alone'
		rayḥīn	[rayḥ^{a}i:n]	'going m.pl.'
	(b)	*bē^{c}*	[be:^{ac}]	'sale'
		lōḥ	[lo:^{a}ḥ]	'board'
		mamnū^{c}	[mamnu:^{ac}]	'forbidden'
		mabḥūḥ	[mabḥu:^{a}ḥ]	'hoarse'

The guttural off-glide in Cairene shares similarities with the well-documented Biblical Hebrew Guttural Lowering described by McCarthy (1994: 211–12).[4] In Tiberian Hebrew, Guttural Lowering affects any vowel before a tautosyllabic root-final guttural. Where the vowel affected is short, the entire vowel is lowered; where the vowel affected is long, only the rightmost mora of the vowel is lowered.

(22)	*šame^{c}*	[ša:ma^{c}]	'he heard'
	gaboh	[gəbah]	'high of'
	mōḥ	[moaḥ]	'marrow'
	nōḥ	[noaḥ]	'eminency'
	rūḥ	[ruaḥ]	'spirit'

In Biblical Hebrew, [guttural] links to the rightmost mora of the stem from the guttural consonant and is accompanied by de-linking of features from that mora:

(23) *Hebrew Guttural Lowering*

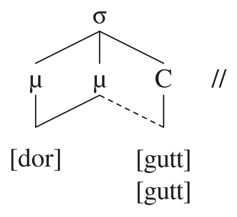


In Cairene, lowering is a mirror-image process which affects the adjacent portion of the adjacent mora rather than the entire mora. I suggest that primary and non-primary [guttural] link from the pharyngeal to the adjacent mora of a [dorsal]

[4] Compare also Delattre's comments on anticipatory gliding before German uvular /ʁ/: 'Except after /a/ and /ə/ the final /-r/ always glided through an obscure /a/ and ended with a very light friction sound' (Delattre 1971: 141).

vowel with no accompanying de-linking of vocalic features. This results in a short contour segment.

(24) *Cairene Guttural Lowering*



10.5 ENHANCING FEATURES AND EMPHASIS SPREAD IN SAN'ANI

The principal acoustic effects of pharyngealization may be enhanced by enlargement of the vocal tract at the lips. In this section, I show that enhancing features may be promoted to compensating features where the enhanced feature, in this case [guttural], is weakened perceptually.

Studies have shown that the domain of emphasis is not constant cross-dialectally. In Abha Arabic (spoken in south-west Saudi Arabia), emphasis rarely spreads beyond the adjacent vowel (Younes 1991); in Qatari, emphasis spreads bi-directionally over the whole word, and where the emphatic is the leftmost segment of a word, may also spread leftward across the word boundary (Bukshaisha 1985: 217–19); in dialects of Palestinian, emphasis spreads bi-directionally within the phonological word, but while leftward spread is generally unbounded, rightward spread is blocked by a set of opaque segments (Herzallah 1990; Davis 1995); in Cairene, emphasis may spread throughout the whole phonological word, may spread leftward across a word boundary, but may be blocked by palatal vocoids, particularly in suffixes, and may also fail to spread into prefixes.

These observations indicate that in phonetic terms emphasis is relative and gradient rather than an absolute phenomenon (cf. Harrell 1957: 80), and that emphatic phonemes in some dialects of Arabic may be phonetically more pharyngealized than in others. Indeed, in many dialects one emphatic consonant in a series (usually the pharyngealized coronal sibilant) tends to be marked by less pharyngeal constriction than the others (Lehn 1963 for Cairene; Ghazeli 1977: 72 for Tunisian; J. Dickins p.c. for Central Sudanese). Some dialects of Sudanese have lost emphatic /ṣ/ altogether (J. Dickins p.c.), and in San'ani a number of roots with emphatic /ṣ/ in Standard Arabic have been reanalysed with plain /s/ or /z/. These include /b-s-r/ < */b-ṣ-r/ 'see' and /z-ġ-r/ < */ṣ-ġ-r/ 'small'. It is therefore not surprising that the degree of pharyngeal constriction in the San'ani oral emphatics differs from, and is less than, that in the Cairene oral emphatics.

Unless the oral emphatics are gradually to merge with their plain counterparts, as indeed has occurred in Maltese and several peripheral dialects of Arabic—

including Chadian and Cypriot Maronite (Kaye 1976: 50)—weakening of the pharyngeal element will be compensated for by strengthening of one of the enhancing features. The most obvious of these is labialization, since this involves expansion at the opposite end of the vocal tract. This is precisely the case in San'ani where labialization has come to compensate for the relatively small degree of pharyngeal constriction in the oral emphatics and spreads from the emphatic phoneme to other segments within the phonological word. As a result, emphasis in San'ani has two phonological exponents—pharyngealization and labialization. Acoustically, labialization lowers both F2 and F1, while pharyngealization lowers F2 but raises F1 (see Section 10.2); therefore the requirement of a compact acoustic spectrum for the oral emphatics appears to be of less perceptual importance in San'ani than in Cairene. In this section, I consider the domain and directionality of spread of pharyngealization and then of labialization from the coronal emphatics.

In San'ani, pharyngealization spreads from right to left within the stem of the phonological word:

(25) *xāṣṣ* 'special' *mistaṭīl* 'long, elongated'
bāṣ 'bus' *fagaṭ* 'only'
manāḍug 'areas, regions' *maraḍ* 'illness'
tsāgaṭ 'it m. falls out'

When a word ending in a plosive is followed immediately by a pharyngealized coronal, or where a plosive falls in the same syllable as a pharyngealized coronal in the following phonological word, this consonant may also be pharyngealized:

(26) *^{c}iddat ṭurug* 'a number of ways' *firzat ṣa^{c}duh* 'the Sa'da taxi rank'
awgāt aḍ-ḍuhr 'around midday'

As in Cairene, pharyngealization spreads into the preceding word in phrases invoking God, but does not spread beyond the immediately adjacent word (cf. (11b)).

(27) *in šā ʔaḷḷāh* 'God willing' *mā šā ʔaḷḷāh* 'fantastic!'

Pharyngealization usually fails to spread into prefixes and clitics, even where these are tautosyllabic with the emphatic:

(28) *bī-rabbaṭ* 'he is tying' *mā ḍarabš* 'he didn't hit'
yiṭla^{c} 'he goes up' *yiḍull* 'he/it m. looks out onto'
bi-tnaḍḍam 'she arranges' *bayn-aṭla^{c}* 'I am going up'

Within the stem of the phonological word, pharyngealization also spreads from left to right—see (29a)—but may be blocked by non-tautosyllabic /iː/, and fails to spread into suffixes unless they are immediately adjacent to the emphatic trigger—see (29b).

(29) (a) *ṭurwag* 'roads' *ṣan^{c}ā* 'San'a'
ṭīn 'mud' *ṭab^{c}an* 'of course'
yixṭā 'he walks' *ṣayf* 'summer'

(b)	*ṭarīg*	'road, way'	*ṭawīl* ~ *ṭawīl*	'long'
	ṭalabāt	'demands'	*ḏarabhā*	'he hit her'
	naḏḏamhum	'he organized them m.'	*maraḏhā*	'her illness'
	šanaṭāt	'bags'		

While pharyngealization spreads predominantly from right to left within the stem of the phonological word, labialization spreads predominantly from left to right. Labialization manifests itself phonologically in the labialization of monomoraic [dorsal] vowels such that /i/ is realized in the environment of a pharyngealized coronal as [u]:

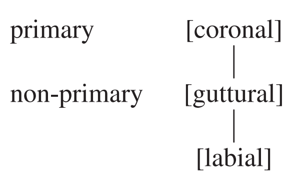
(30)	*^{c}āṭuš*	'thirsty'	cf. *tā^{c}ib*	'tired'
	ṣāyum	'fasting'	cf. *kātib*	'writer'
	yiṭallu^{c}	'he takes (something) up'	cf. *yidalli^{c}*	'he spoils (someone)'
	ṭarīguh	'way, method'	cf. *kabīrih*	'old f.s.'
	yiwaṣṣul	'he brings'	cf. *yiwaggif*	'he stops (something)'
	maḏārub	'wooden beaters'	cf. *madāris*	'schools'

Unlike pharyngealization, labialization is not restricted to the word stem. It also targets all monomoraic [dorsal] vowels in suffixes (31a) and enclitics (31b):

(31)	(a)	*magṭūbuh*	'diligent f.s.'	cf. *maktūbih*	'written f.s.'
		yiwaṣṣuluh	'he brings it m.'	cf. *yiwaggifih*	'he stops it m.'
		yiṭallu^{c}hun	'he takes them f. up'	cf. *yidalli^{c}hin*	'he spoils them f.s.'
		yiṣallaḥan-nanahun	'they f. fix them f.'	cf. *yisabbiran-nahin*	'they f. make them f.'
		faṣluš	'your f.s. class'	cf. *darsiš*	'your f.s. lesson'
	(b)	*yifṭurūbuh*	'they m. break the fast with it m.'	cf. *yizgamūbih*	'they m. seize it m.'
		ḥāfiḏluh	'remembering it m.'	cf. *jāhizlih*	'ready m. for it m.'

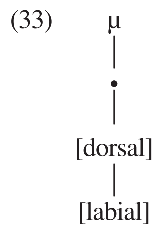
In emphasis spread in San'ani, the erstwhile enhancing feature [labial] has adopted the role of compensatory feature with the result that non-primary [labial] is now more active in signalling emphasis spread than non-primary [guttural]. Thus, in contrast to Cairene, in San'ani, [labial] has attained the status of a phonological feature in the representation of the pharyngealized coronals in San'ani. The representation of pharyngealized coronals given in Section 3.4.7 is revised in (32) for San'ani to include non-primary [labial].

(32) Pharyngealized coronals (SA)



[Labial] spread targets monomoraic [dorsal] vowels only. Since the only [labial] vowel phoneme in the language is also [dorsal], [labial] spread can be said to be subject to the following positive condition:

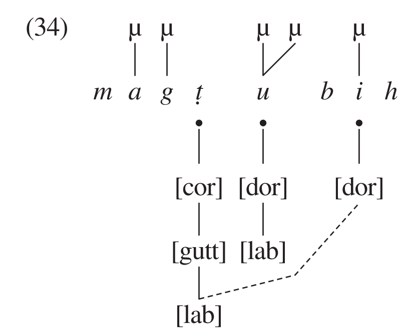
(33)



10.5.1 *[Labial] spread and transparent segments*

[Labial] targets all monomoraic [dorsal] vowels within the phonological word to the right of the trigger, irrespective of the identity of the intervening segments. Thus, in contrast to pharyngealization, which is blocked by dorsal vocoids to the right of the emphatic in several dialects of Arabic (see Sections 10.4 and 10.5, Herzallah 1990, and Davis 1995 for Palestinian dialects), labialization has no opaque segments: all segments other than monomoraic /i/ are transparent to [labial] spread. This includes vowels which are already specified for [labial]—as is the case in the word *magṭūbih* 'diligent f.s.', realized as *magṭūbuh*, where [labial] targets the final monomoraic [dorsal] vowel, bypassing /u:/:

(34)

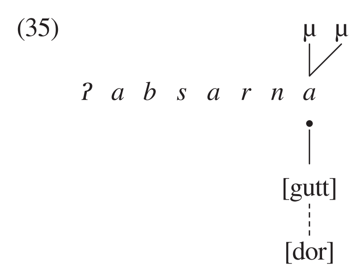


The transparency of /i:/ to [labial] spread is due to the relative strength of the segment: stronger segments are more resistant to assimilation than weaker segments (see Section 8.2; Mohanan 1993: 91), and one coordinate of segment strength is increase in duration (see Section 9.2.6; Mohanan 1993: 103). We have already seen two examples of longer segments resisting assimilatory processes which their short counterparts are subject to: in San'ani, intervocalic voicing affects single obstruents, but not geminate obstruents; and in Cairene, a geminate /tt/ is a third less likely to palatalize in a palatalizing environment than its short counterpart (cf. Haeri 1997: 54). Part of the reason that long vowels are less subject to assimilation than their short counterparts is the relative tenseness of the vowel: the longer the vowel, the tenser it will be (Mohanan 1993: 105). Thus, although some [labial] protrusion is apparent on /i:/ in words such as *ṭawīluh* 'long f.s.', [labial] spread is simply a pho-

netic process which fails to change the position of the vowel on the front–back axis. I assume that, phonologically, non-primary [dorsal] is assigned to [dorsal] vowels linked to two moras (see Section 3.4.4), whereas monomoraic [dorsal] vowels in San'ani are underspecified for the non-primary feature at the stage at which non-primary [labial] spreads from an underlying pharyngealized coronal.

The [guttural] vowel /a/ is also transparent to spread in non-final position, as illustrated in *ṣāyum* 'fasting m.s.', *aṣḥābuh* 'his friends', *maṭraguh* 'hammer', and *ṭawīluh* 'long f.s.'. In pre-pausal position, however, /a:/ is realized as [o:] to the right of an emphatic, as in *ṣallaynō* 'we prayed' and *ḍarabnō* 'we hit'. This is attributed to the fact that /a:/ is subject to raising in pre-pausal position[5] and realized in non-emphatic environments as [e:], as in: /*ʔabsar* + *nā*/ > *ʔabsarnē* 'we saw' and /*garray* + *nā*/ > *garraynē* 'we taught'. The pre-pausal raising of /a/ is a feature recognized by the Arab grammarians and attested in a number of modern Arabic dialects including several Egyptian dialects (though not modern Cairene) and dialects spoken in the Levant. I interpret pre-pausal raising as the appendage of non-primary [dorsal] to a [guttural] vowel, as in (35).

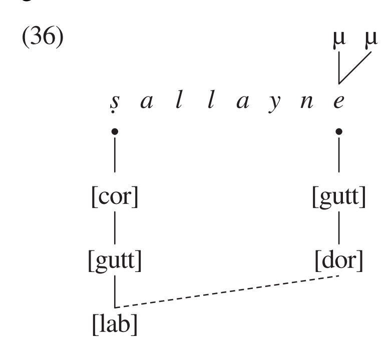
(35)



Output: *ʔabsarnē* 'we saw'

The presence of [dorsal] creates the phonological environment for [labial] spread in case the phrase-final vowel is preceded in the phonological word by a pharyngealized coronal:

(36)



Output: *ṣallaynō* 'we prayed'

[5] Described in Arabic as *imālah*.

10.5.2 *The directionality of [labial] spread*

Leftward spread of [labial] is far more restricted than rightward spread. To the left of a pharyngealized coronal, [dorsal] vowels are realized as [u] within the stem in lexicalized forms:

(37)	*mulgāṭ*	'tongs'	cf.	*miftāḥ*	'key'
	ḥāmuḏ̣uh	'soured fenugreek'	cf.	*kātibih*	'writer f.'
	nuṣṣ	'half'	cf. Standard	*niṣf*	
	fuḏ̣ḏ̣uh	'silver'	cf. Standard	*fiḏ̣ḏ̣ah*	

To the immediate left of a pharyngealized coronal, [dorsal] vowels are usually realized as [u] in derived stems:

(38)	*alaxbuṭ*	'I get mixed up'	cf.	*agambir*	'I sit'
	barāguṭ	'lumps'	cf.	*barākis*	'bundles'
	tiġammuḏ̣	'she closes (eyes)'	cf.	*tidarris*	'she teaches'
	yilagguṭ ~ yilaggiṭ	'he picks up'			
	yilāḥuḏ̣ ~ yilāḥiḏ̣	'he observes'			

[Labial] spread into the imperfect prefix vowel is common where vowel-final stems are involved (Watson 1995*b*, 1999*a*: 296), but is otherwise rare even where the emphatic is tautosyllabic with the [dorsal] vowel. The examples in (39a) compare with those in (39b).

(39)	(a)	*yuḏ̣wī*	'he goes home'	cf.	*yibnī*	'he builds'
		yuṣfī	'he cleans'	cf.	*yimlī*	'he fills'
		yuxṭā ~ yixṭā	'he walks'	cf.	*yidrā*	'he knows'
		yuṣaffī	'he cleans'	cf.	*yimallī*	'he fills'
		yuṣalfī	'he cleans'	cf.	*yisawwī*	'he does/makes'
	(b)	*yiṭla*^{c}	'he goes up'		*yiḏ̣rub*	'he hits'
		yiḍambul	'he drums'		*yiḏ̣ull*	'he/it m. looks out on'

Thus, we have a situation in which left-to-right spread of [labial] is exceptionless, whereas right-to-left spread is restricted and optional even when the potential undergoer is tautosyllabic with or otherwise immediately adjacent to the trigger. As for the directionality of pharyngealization, so the directionality of labialization is attributable to an asymmetry in timing between the primary and non-primary articulation. In contrast to pharyngealization where the pharynx narrows prior to the hold phase of the primary articulation, protrusion of the lips in labialization tends to occur on or after the hold phase of the primary articulation (Ladefoged and Maddieson 1996: 357–8). As a result, the second formant of a vowel following a labialized consonant is lower than the second formant of a vowel preceding a labialized consonant resulting in the typical perseverative nature of [labial] spread. Therefore, while the unmarked direction of [guttural] spread is right to left, the unmarked direction of [labial] spread is left to right.

10.5.3 *The pharyngeals*

The pharyngeals in San'ani are articulated with a small degree of labial protrusion.[6] In contrast to the coronal emphatics, however, labial protrusion in the pharyngeals is simply a phonetic enhancing feature, and does not spread to other segments within the word. Among speakers from established San'ani families within the old city, evidence of labial protrusion in the pharyngeals is seen in a few non-derived stems which have rounded [dorsal] vowels; for other speakers, the same stems have non-rounded [dorsal] vowels. Consider the following examples (non-labialized forms from speakers outside the old city given in brackets):

(40)	*ḥulbuh*	'fenugreek'	(*ḥilbih*)
	ᶜurus	'wedding'	(*ᶜiris*)
	ᶜušā	'evening prayer'	(*ᶜišā*)
	ᶜušrīn	'twenty'	(*ᶜišrīn*)
	ᶜumwad	'pillars, columns'	(*ᶜimwad*)

For established San'ani speakers, there are, however, a large number of stems with pharyngeals and adjacent /i/ vowels, including: *ᶜind* 'with, at, by', *ḥiss* 'feeling', *ḥilfih* 'entertainment of a guest in family ceremonies'. It seems, therefore, that the few stems given in (40) are lexicalized, and that the *u* vowels here are not the result of a synchronic [labial] spread process. There is no evidence of [labial] spread from the pharyngeals in derived forms. Consider the examples in (41) (examples of [labial] spread from oral emphatics are given in the right-hand column).

(41)	*al-ḥabaših*	'Ethiopia'	cf.	*ṭabaguh*	'layer'
	matāḥif	'museums'	cf.	*manāṭug*	'regions'
	ḥāmil	'pregnant'	cf.	*ṣāyum*	'fasting m.s.'
	ᶜammih	'his paternal uncle'	cf.	*ṣaffuh*	'his class'

Thus, while [labial] in the pharyngealized coronals has been promoted from the status of phonetic enhancing feature to that of phonological feature, in the case of the pharyngeals it has not. The pharyngeals are represented with non-primary [guttural], as for the pharyngealized coronals, but without the additional non-primary [labial]:

(42) Pharyngeals

primary	[guttural]
	|
non-primary	[guttural]

[6] In San'ani, emphasis spread from pharyngeals results in a general lowering of adjacent long and short vowels, and in the case of long [dorsal] vowels does not produce a guttural off-glide as it does in Cairene. Guttural off-glides are attested in other Yemeni dialects, however, including dialects spoken in and to the south of the province of Ibb.

The slight labial protrusion in the pharyngeals is a phonetic enhancing feature, just as lip rounding and labial protrusion is a phonetic enhancing feature in the Cairene pharyngealized oral consonants. The fact that the pharyngealized coronals in San'ani have an additional non-primary [labial] feature and the pharyngeals do not does not mean, however, that the latter should be excluded from the larger class of emphatics. Just as different emphatic phonemes may differ within one dialect in the degree of pharyngeal constriction, so one sub-set of emphatics may promote a phonetic enhancing feature to the status of phonological feature while another sub-set does not.

10.6 CONCLUSION

The previous chapters each dealt with a number of related phonological and morphological issues. In this chapter, I focused exclusively on the definition and description of emphasis and emphasis spread, the complexities of which require detailed treatment. Following Jakobson (1957), Garbell (1958), and others who expand the notion of emphasis to include the pharyngeals and the uvulars as well as the traditional coronal emphatics, I addressed the articulatory and acoustic correlates of emphasis, the phonetic realization of emphasis spread in vocalic undergoers, the domain of emphasis spread, and the directionality of spread. The difference in the realization and domain of emphasis spread from the different sub-classes of emphatics I attribute to the combinatorial feature specification of the trigger segment and to the tension of the dorsum in the articulation of the coronal emphatics. Emphasis spread from the coronal emphatics in San'ani involves non-primary [labial] in addition to non-primary [guttural], a feature which serves simply as a phonetic enhancing feature in the Cairene emphatics. In contrast to [guttural], which spreads predominantly from right to left in both dialects, [labial] targets all monomoraic [dorsal] vowels to the right of the emphatic within the phonological word, but right-to-left [labial] spread is restricted to immediately adjacent [dorsal] vowels within the stem or to the vowel of the imperfect prefix in final-weak verbs. The difference in the directionality of spread is attributed to an asymmetry in timing between the primary and non-primary articulation in secondary articulations: while pharyngealization is anchored more on the onset of the primary articulation, protrusion of the lips in labialization tends to occur on or after the hold phase of the primary articulation. Thus the unmarked direction of spread of [guttural] is right to left, while the unmarked direction of [labial] spread is left to right.

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